BRISTOL TRAFFIC &
TRANSPORTATION CONSULTING LLC
Traffic Studies, Roadway Designs, Intersection Improvements

Scope of a Traffic Study
For Flexible Residential Subdivision project off North Street.

Intended scope of a traffic study for the Grafton Planning Board review under the Special Permit requirements for a Flexible Development versus a Standard Development subdivision.

A review of the two plans for this residential subdivision on land along the north side of the Mass. Turnpike spanning between North Street and Magnolia Lane in Grafton, MA shows that the Flexible Development option would provide 36 building lots for similar residential homes as exist in the area.

According to the Institute of Transportation Engineers (ITE) 10th Edition Trip Generation Manual, single family homes typically generate 0.74 vehicle trips per house during the AM peak hour of the local street network, resulting in this Flexible Development subdivision layout generating 24 AM peak hour trips with 18 exiting and 6 entering the subdivision onto or from North Street. Only 3 trips would typically be made on Magnolia Lane during the AM or PM peak hours with 2 exiting and one entering during the same AM peak hour of the nearby roadways from the four homes with access to Magnolia Lane. Keeping in mind that both plans have two access points, with one on North Street and the second entrance/exit located on Magnolia Lane. This points out the low volumes of traffic that can be expected during the morning peak traffic period between 7:00 and 9:00 AM.

Similarly the ITE Trip Generation Manual indicates that 0.99 vehicle trips per house are typically generated during the PM Peak Hour for the Flexible plan. This indicates that the 36 house lots will create only 36 trips with 13 trips exiting and 23 entering the two access points during the PM peak hour. Again this shows how low a new traffic volume can be expected during the PM peak hour between 4:00 to 6:00 PM.

Trips from the site during these busiest peak periods for the entire day, tend to go in different directions dependant on their final destination. So it is understood that the farther one travels from the subdivision intersections on North Street and Magnolia Lane, the fewer the vehicles from the site travel on each distant roadway. Thus reducing any negative impacts on local intersections after the first split and potentially the second turn that the driver makes. Indicating that as drivers travel away, some may turn one way and the next driver may choose a different road to follow to their destination, creating minimal impact on distant intersections as one travels. Vehicles passing the outer intersections will be spread amongst the various roadways so the small number of site generated trips listed in the above paragraphs, will be split, such that it minimizes any impacts at more distant intersections..

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With the above in mind, we have selected the three intersections circled on the attached map (Figure 1), plus the actual driveway onto North Street as listed below, to study new turning movement traffic counts to be taken at times overlapping the peak hours, then by analyzing the existing pattern of turns the outbound traffic makes, determine the level of new traffic passing through the study intersections. each circled intersection during the same peak travel hour in the AM and PM, to review accident history on each of those intersections and present our findings in a report to be reviewed by the Planning Board or representative peer reviewers.

The 4 intersections studied are:

North Street at Bicknell Road,
North Street at Wesson Street,
Wesson Street at Willard Street.
Plus the site roadway at North Street, that does not exist at this time.

These intersections are circled on the towns GIS map section on Figure 1 to follow.

Once the counts were collected last February, an interesting pattern was determined from the Data. A strong pattern of morning travel north on North Street, then turning east on Wesson Street followed by a left turn from Wesson Street onto Willard Street. The pattern reverses during the evening peak hour of travel thus indicating the chosen intersections are in fact the ones in the region that are likely to see the majority of this site's rather minor amount of site generated trips in both the AM and PM peak periods.

We additionally researched accidents that have occurred during the seven years from 2011 through 2017, the latter being the most recent year of data ready for public use from MDOT. Surprisingly the only accident that occurred at the 4 study intersections within that 7 year period was located at Wesson Street/North Street involving a single vehicle turning eastbound to southbound and hitting a parked Farm Equipment parked near the intersection. The other study locations had no intersection accidents. A few accidents in the vicinity of the study locations included single vehicles hitting a curb, utility pole or even a stone wall. These were not related to the actual study intersections with some noted to be hundreds of feet away but the closest intersection happened to be one of the study intersection so it was written up as being on Wesson or North streets nearby.

The results of the accident data research indicates that there are not any significant accident safety issues within the intersections studied. Sight distances satisfy the required Stopping Sight Distance as discussed later in this report with most of the intersection approaches where vehicles stop also satisfy the desirable Intersection Sight Distance standard. Although the standard is that the Stopping Sight Distance must be satisfied, so the approaching vehicle has adequate time to and distance stop for any object or vehicle in the road, where sight lines have some blockage there is still adequate

ISD when the vehicle pulls a bit forward closer but not within the edge of pavement of the through roadway to allow the side street driver to exceed the intersection sight distance as well.

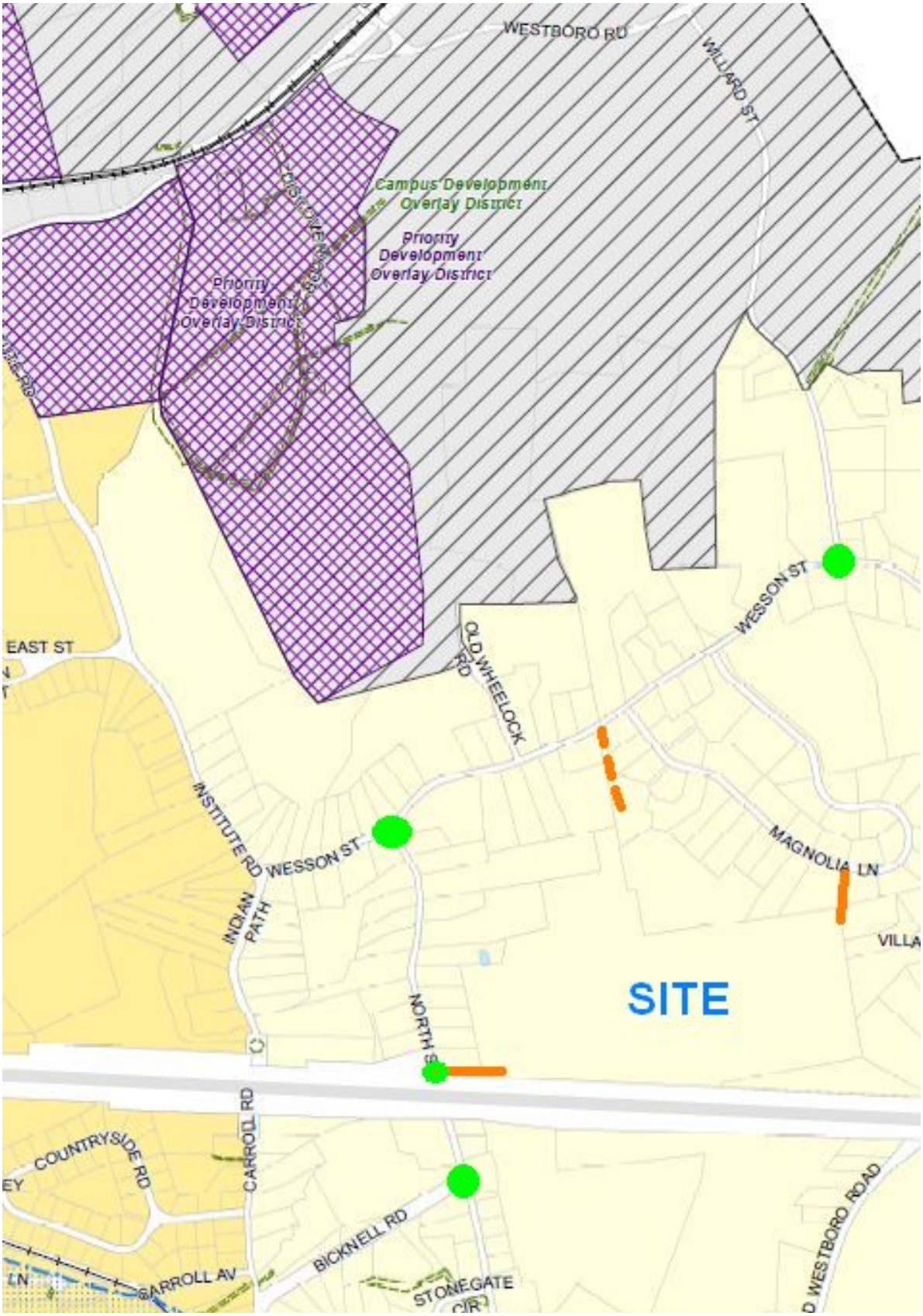
The traffic intersection counts during 3 hours each peak AM and PM period at the study intersections as well as a two day 24 hour Automatic Traffic Recorder printout to show hourly what the traffic volumes are on North Street at the proposed new subdivision access roadway for safety of the new trips to be generated by the 36 new residences. Additionally, the proponents are seeking an easement from MDOT to allow the outdated abrupt guardrail end on the east side of North Street extending from the bridge abutment, to be curved around the southwest corner of the new roadway to provide a 25 foot radius curb line and curved, updated safe terminus of the guardrail to improve safety for southbound North Street traffic approaching the bridge abutment on state land above the Mass Turnpike..

Traffic estimates based on the ITE standard projections are shown on three sets of intersection data graphics. The first listing the existing trips at each study location so the Board may get a feel for the trip pattern traveling North in the AM peak hour and returning south during the PM peak hour of travel. The second set of count graphics shows what the site generated trips would be at each of the study locations, and the final third set shows the existing traffic with the new site trips merged into the graphics to indicate how minor the impact will be on the study intersections.

We hope that this information is helpful to the Town while reviewing the traffic study scope of coverage and results for this proposed development to identify that the impact of this project on the local roadways is not significant, with plenty of additional reserve capacity and safety to handle the site traffic safely and future traffic growth in the area of the project.

Sincerely,
BTTC

Lloyd G. Bristol, PE.
Manager



BTTC

PROPOSED 4 STUDY INTERSECTIONS

NORTH STREET SUBDIVISION (Flexible Option)
GRAFTON, MASSACHUSETTS (Zoning Map)

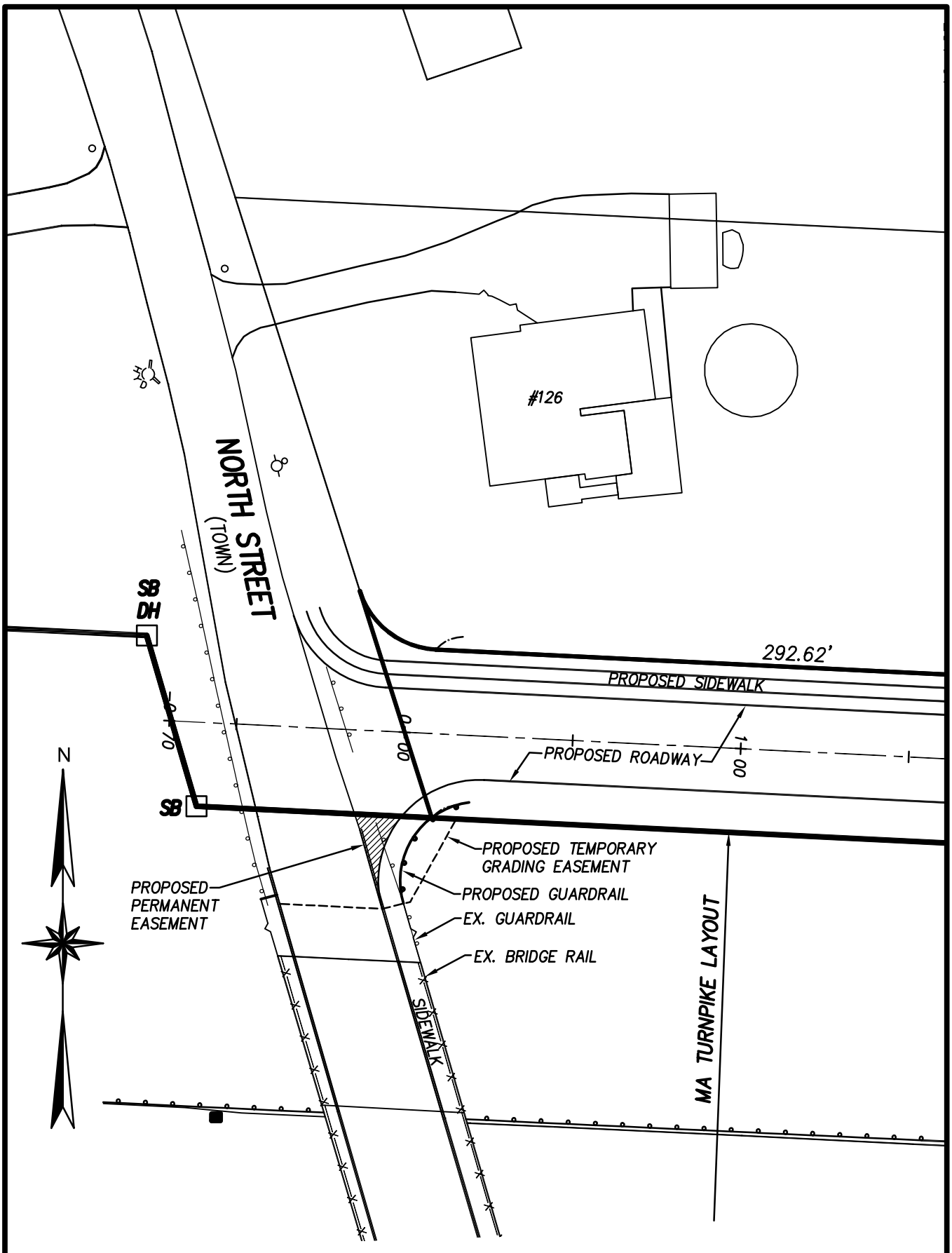
FIGURE 1

BRISTOL TRAFFIC & TRANSPORTATION CONSULTING, LLC N. BROOKFIELD, MA

MDOT Land Easement

We have spoken with the MDOT District 3 office regarding the potential to procure a minor temporary and a permanent corner radius easement at the south side of the site roadway so we can place a 25 ft radius curb corner and also replace the guardrail on the same corner near the bridge abutment with an updated much safer guardrail rounding and terminus. We were informed that this is a frequent item that MODT does allow, however it takes time to process the easement. It has been more than 8 months since we made the request in Boston through MDOT Traffic and ROW and are awaiting an answer and some paperwork to complete this task.

Attached here is a sketch indicating how minor the change in ROW lines would be so we will keep the Board informed on our progress.



NORTH STREET SUBDIVISION
GRAFTON, MA

SCALE: 1"=40'

Proposed Subdivision Roadways

Intersections at Existing
North Street & Magnolia Lane
Grafton, MA

Intersections Site Distance Analysis

May 6, 2019

Prepared for:

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Prepared by:

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1. INTRODUCTION

1.1 Scope of Analysis

This report documents the findings and conclusions of a sight distance analysis conducted for a proposed preliminary residential subdivision roadway access to North Street and Magnolia Lane as well as an emergency only access/egress to Wesson Street, each located in Grafton, MA. Two preliminary plans for the subdivision are being submitted to the town planning board for review. One plan is a standard subdivision layout with single access points to both North Street and Magnolia Lane roadways. The second plan is for a reduced house lot sized Flex Plan footprint layout that creates significantly larger areas dedicated to open space. The second plan utilizes access to Magnolia Lane and North Street at the same locations as the first plan. However the second plan also includes an emergency only access way creating a site intersection onto Wesson Street that will be restricted from day to day use by the residents of this proposed subdivision option. This emergency access/egress is to be provided due to the creation of a cul-de-sac road layout that provides an emergency access/egress roadway from the cul-de-sac to Wesson Street only should the main access to North Street be temporarily unusable.

1.2 Sight Distance Measurement Reference Sources

Sight distance available for the vehicles approaching the proposed subdivision road intersections and available for the vehicles exiting the subdivision roadways onto North Street, Magnolia Lane and at the potential emergency exit location on Wesson Street were each field measured. These measurements were taken in accordance with requirements in both the American Association of State Highway and Transportation Officials (AASHTO) publication titled A Policy on Geometric Design of Highways and Streets, 2018, 7th Edition and also included in the Massachusetts Department of Transportation (MassDOT) Highway Division publication titled 2006 Massachusetts Highway Department Project Development & Design Guide, that quotes the requirements from the same AASHTO document. These are the guidelines currently used to determine available sight distances and standards for providing required stopping sight distances for safety at intersections and along continuous roadway segments.

Stop lines are not mandatory at side street intersections with stop sign control. Stop line locations, when used, are established in the Federal

Highway Administration (FHWA) 2009 publication titled the Manual of Uniform Traffic Control Devices (MUTCD), with revisions in 2012.

2. REFERENCE SOURCE MEASUREMENT METHODOLOGIES AND RECOMMENDED SIGHT DISTANCES

2.1 AASHTO Stopping Sight Distance (SSD)

Drivers approaching an intersection or any obstacle encountered on a roadway require time to recognize that the object (or vehicle) that is in it's travel path is a hazard necessary to react to. They also require the time needed to actually apply the brakes and either slow or stop the vehicle at a reasonable deceleration rate (not skidding or an uncomfortably harsh stopping maneuver). This total time is known as the perception and reaction time plus actual braking time. During this time period the vehicle travels at the approach speed then stops safely or slows significantly enough to avoid the obstacle if provided with the appropriate length of sight distance.

This perception/reaction and stopping distance length traveled before coming to a stop is dependent on the speed the vehicle is traveling and the available length of visibility on the through roadway. North Street has a 30 MPH speed limit posted that requires a car to have 200 feet of available stopping sight distance to safely stop on wet pavement, with average tire tread, without an excessively aggressive stopping maneuver. The two other streets analyzed, Wesson Street and Magnolia Drive, lack speed signage and based on the close spacing of the housing units and width of roadways, it is assumed 30 MPH is a reasonable speed for those roads as well.

The object height that AASHTO has determined to be the reasonable height for an approaching driver to spot and identify any object as a hazard to them, is 2.0 feet high, as measured above the road surface. This is the average height of a car headlight or tail light, so the approaching driver can avoid impact with a vehicle stopped in the approaching drivers lane. The height AASHTO defines as typical for the normal drivers eye above the road surface is 3.5 feet, and is used to measure stopping sight distance.

So this sets the method to measure available stopping sight distance on any non-stop controlled approach to an intersection or on a continuous roadway. The sight line needs to be clear from 3.5 ft for the driver eye

height looking for an object 2 feet above the lane surface, at any intersection or along the through roadway.

This measurement is taken in the field for all through, uncontrolled approaches to verify that vertical curvature of the road surface or a horizontal curve do not create a high point or side of road blockage within the required 200 foot safe stopping distance for these roadways 30 MPH approach speed. (see Table 3-1 in Appendix)

2.2 AASHTO Intersection Sight Distance (ISD)

Intersection sight distance is described in the AASHTO Policy publication Section 9.5. (see Appendix for pertinent pages from this section).

Intersection sight distance (ISD) is measured differently than Stopping Sight Distance (SSD) and the method will be described here.

An important point made in the AASHTO policy and also repeated in the MassDOT Highway guide book, is included in the Appendix, the fourth paragraph on Page 9-35, which is in Section 9.5.1, General Conditions. The AASHTO paragraph states "If the available sight distance for an entering or crossing vehicle is at least equal to the appropriate stopping sight distance for the major road, then drivers have sufficient sight distance to anticipate and avoid collisions. However, in some cases, a major-road vehicle may need to slow or stop to accommodate the maneuver by the minor road vehicle. To enhance traffic operations, intersection sight distances that exceed stopping sight distances are desirable along the major road." This defines the minimum ISD that is safe and equal to the SSD. In our case that SSD is 200 feet for 30 MPH.

Keep in mind that the subdivision road intersections with town roads will have side street stop sign controls so side road vehicles will stop to look for oncoming vehicles. Section 9.5 covers all types of intersection controls from no stops on four legs to 4-way stop or side road only stops.

ISD is measured from the driver's eye height on the side street to the drivers eye height of the approaching vehicle. Both are set at 3.5 feet above the road. This indicates that if the stopped side road vehicle driver can see the oncoming vehicle then the oncoming vehicle can also see the side road vehicle. Additionally, the side road vehicle is assumed to be set back from the edge of travel way of the through road. The set back distance a majority of vehicles stop on side roads was found to be "6.5 ft or less" from front grill of car to edge of through roadway. This places the

drivers eye an additional 8 ft from the front grill of the stopped car for the majority of cars in the US. So measurements are made from 14.5 ft from edge of roadway to the left and right looking at the middle of the approaching lane, to determine the intersection sight distance (ISD) available.

The MUTCD reference publication produced by the Federal Highway Administration (FHWA) states that stop line stripes should be placed 4 ft from crosswalks or 4 ft from an edge of road, with the option of being farther away on side roads if conditions dictate. For the proposed new subdivision road intersections at North Street, Magnolia Lane and for the Flex option plan also at Wesson Street, the proposal is to place the stop lines at 4 ft from edge of through roadway. In the above AASHTO recommended location for measuring the sight triangle the car will be assumed to stop with the front grill 2.5 ft prior to the stop line.

AASHTO recommends an ISD for a stopped vehicle turning left onto a 30 mph through roadway to be 335 ft (See Table 9-7 in the appendix) for operational efficiency, not safety reasons. They recommend an ISD for a stopped vehicle turning right onto a 30 MPH roadway to be 290 ft (see Table 9-9 in the appendix) for operational efficiency.

3. MEASURED SIGHT DISTANCES AT PROPOSED NEW INTERSECTIONS

3.1 Subdivision Road at Magnolia Lane

3.1.1 Stopping Sight Distance (SSD) measured from the northwest (left) is greater than 500 feet. Measured from the southeast (right) it is 265 feet. Both exceed the 200 foot safety standard by AASHTO for 30 MPH.

3.1.2 Intersection Sight Distance (ISD) measured for a car turning left is greater than 400 feet to the northwest (left) and is 360 feet to the east, both exceeding the AASHTO desirable 335 feet. For a car turning right the ISD is greater than 400 feet to the northwest (left) that exceeds the desirable 290 feet listed by AASHTO.

3.2 Subdivision Emergency Only Road at Wesson Street (Flex Plan Only)

3.2.1 Stopping Sight Distance (SSD) measured from the West is greater than 500 feet. Measured from the east (right) it is greater than 500 feet. Both exceed the 200 foot safety standard by AASHTO.

3.2.2 Intersection Sight Distance (ISD) measured for a car turning right is greater than 500 feet to the left, which exceeds the AASHTO desirable 290 foot line of sight. For a car turning left the sight line to the left is greater than 500 feet, which exceeds the AASHTO desirable 335 feet and to the right the sight line is approximately 130 feet at the 14.5 foot setback from edge of road to grill of car. However if the car pulls forward 2.5 feet so the grill is at the stop line 4 feet from the edge of road, the sight line to the east increases to 350 feet which exceeds to AASHTO desirable distance for operational efficiency.

Keeping in mind that in an unlikely event that North Street roadway intersection becomes inaccessible for a period, then and only then would the Wesson Street emergency roadway be used.

3.3 Subdivision Road at North Street

3.1.1 Stopping Sight Distance (SSD) measured from the south (left) is greater than 500 feet. Measured from the north (right) it is 315 feet. Both exceed the 200 foot AASHTO safety standard for the approaching car to be able to safely stop, should that become necessary.

3.1.2 Intersection Sight Distance (ISD) measured for a car turning left is 167 feet to the south and 350 feet to the north, exceeding the desirable 335 feet to the north. However if the side street car moves forward so the car front grill is at the stop line, 4 ft from the edge of road, instead of stopping "6.5 feet or less" as the average distance was established by AASHTO, the vehicle is still not close to the road edge with 4 feet of distance between the car and pavement. Then the (ISD) sight line to the south increases to be the AASHTO desirable 335 feet for operational efficiency, not for safety. Should the car move so the front tires are at the stop line, the line of sight is increased further to 510 feet. This is with the grill of the car still 1.5 to 2 feet from the road pavement.

The reason the sight line to the south is reduced when the car grill is the 6.5 feet from the road pavement is the existing concrete parapet post for the bridge over the Mass Turnpike to the south. Moving the car forward only 2.5 feet allows the driver sitting 8 feet behind the grill of the average car to see in front of the concrete post to the full 335 feet desirable sight line.

4. STUDY CONCLUSIONS

The study indicates that each of the three potential subdivision roadway intersections with existing town roads provide adequate intersection and stopping site distances that will not put the through vehicles or the side street vehicles in danger. As AASHTO reference states the Stopping Site Distance is the most important criteria and each intersection satisfies that distance. A secondary sight distance is the intersection sight distance that is desirable to enhance traffic operations. However their statement as quoted in the report does make it clear that if the side street vehicle driver has available to them the Stopping Sight Distance needed for the oncoming vehicle to stop, then drivers have sufficient sight distance to anticipate and avoid collisions.

Another finding is that the AASHTO assumed average stopping location distance from the main road being “6.5 feet or less” therefore the distance has been set at 6.5 feet for the front of the car and the driver is typically another 8 feet back from the front of the vehicle, so totaling 14.5 feet. This distance assumes that the front grill of the car is at minimum 2 feet from the stop line which is set at 4 feet from the through street edge. If the car pulls forward to the stop line in each of these intersections the Intersection Sight Distance is available so traffic operations can be enhanced at that stopping point.

Overall the review and field measurements indicate that the sight distances available are sufficient to avoid collisions and improve operational efficiency at all three of the potential intersections.

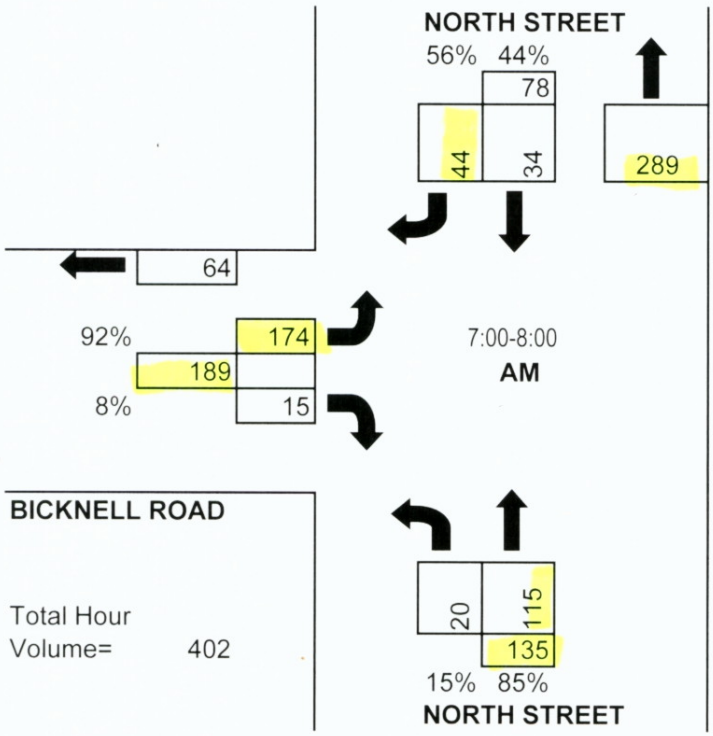
APPENDIX

AASHTO Excerpts and Tables listing desirable distances, from Key Subsections referenced in report.

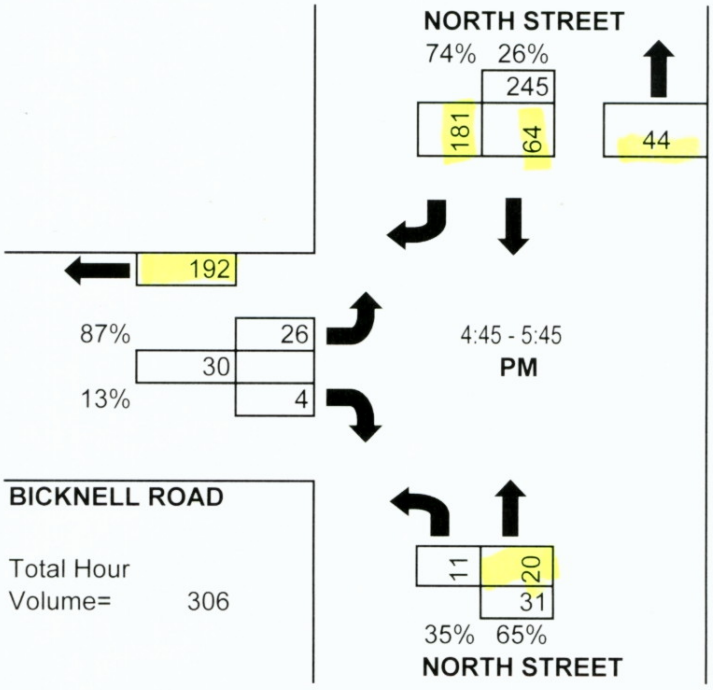
Subsection 3.2.2 Stopping Sight Distance text.
Table 3-1 SSD for safety based on speed.
Subsection 9.5 Intersection Sight Distance text.
Table 9-7 ISD for Left Turn Vehicle from Stop.
Table 9-9 ISD for Right Turn Vehicle from Stop.

Peak Hour Turning Movement Count

Grafton, MA - North St. / Bicknell Rd. Existing
Turning Movements in One hour Starting with 7:00 AM
Tuesday February 11, 2020



Turning Movements in One hour Starting with 4:45 PM
Tuesday February 11, 2020

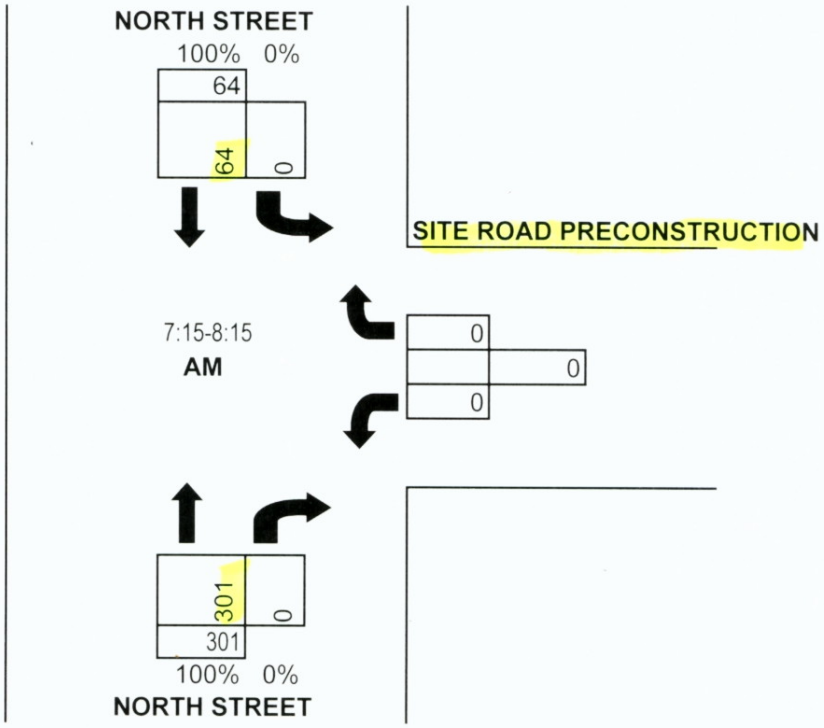


Compiled By:
Bristol Traffic and Transportation Consulting LLC

Peak Hour Turning Movement Count

Grafton MA - EXISTING North St Through Traffic @ Site Roadway

Turning Movements in One hour Starting with 7:15 AM



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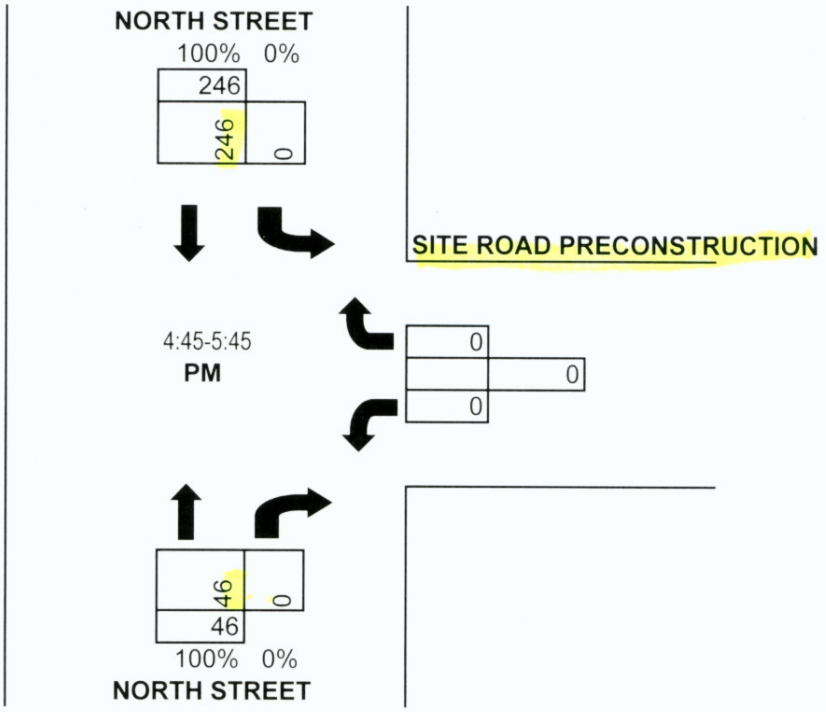
Turning Movements in One hour Starting with 4:45 PM

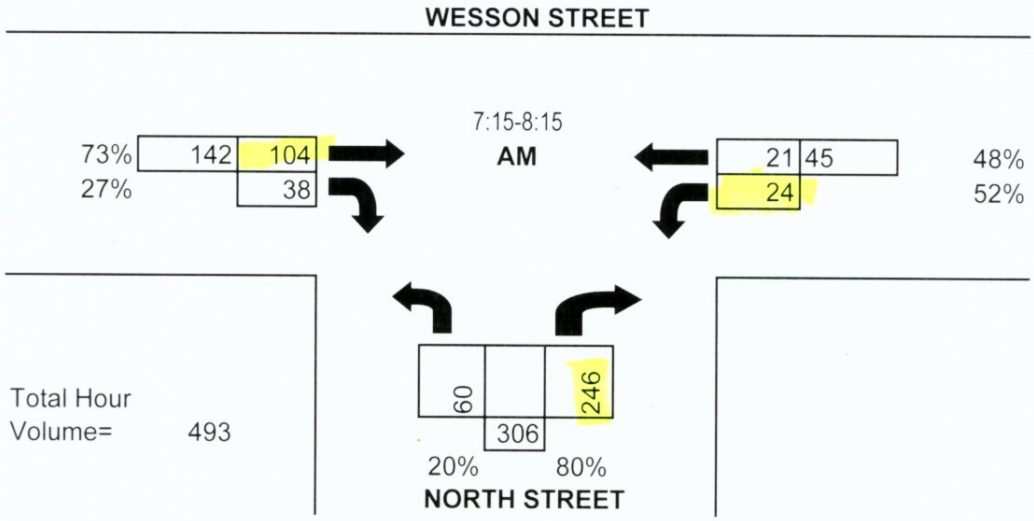


Total Hour Volume= 292

Compiled By:
Bristol Traffic and Transportation Consulting LLC

Peak Hour Turning Movement Count

Grafton, MA - Wesson St. / North St. Existing
Turning Movements in One hour Starting with 7:15 AM
TUESDAY February 11, 2020



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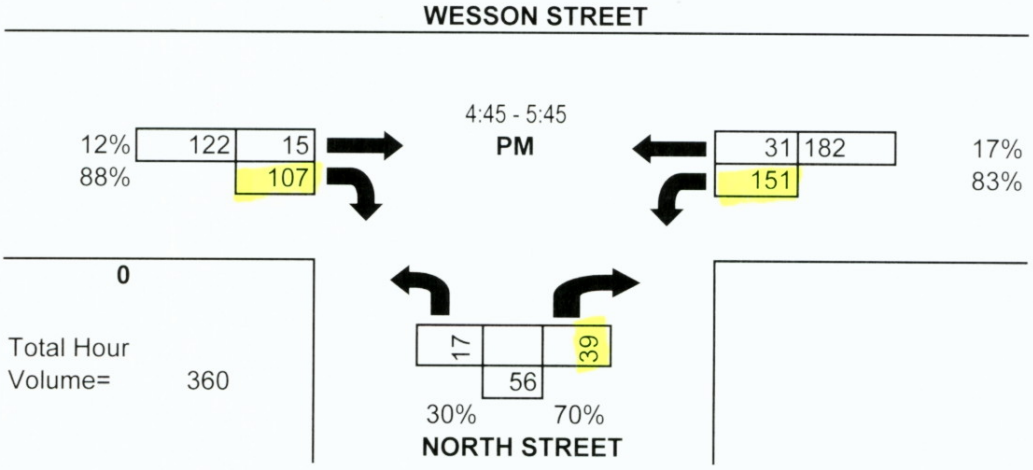
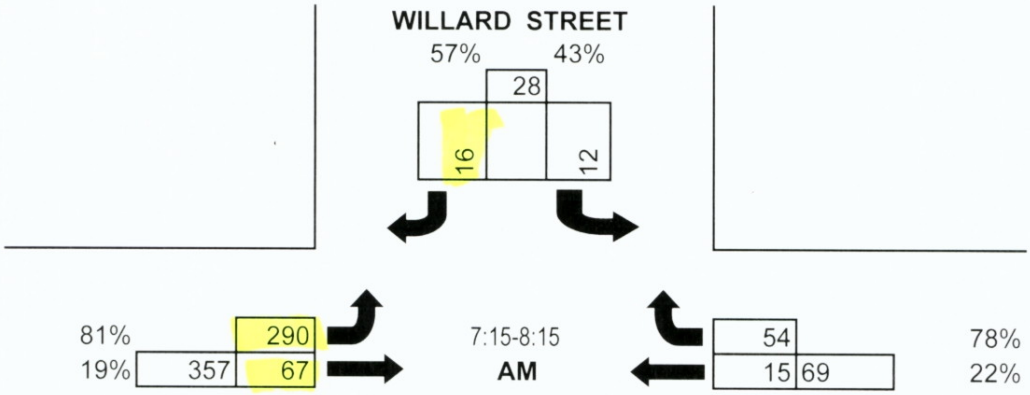


Compiled By:
Bristol Traffic and Transportation Consulting LLC

Peak Hour Turning Movement Count

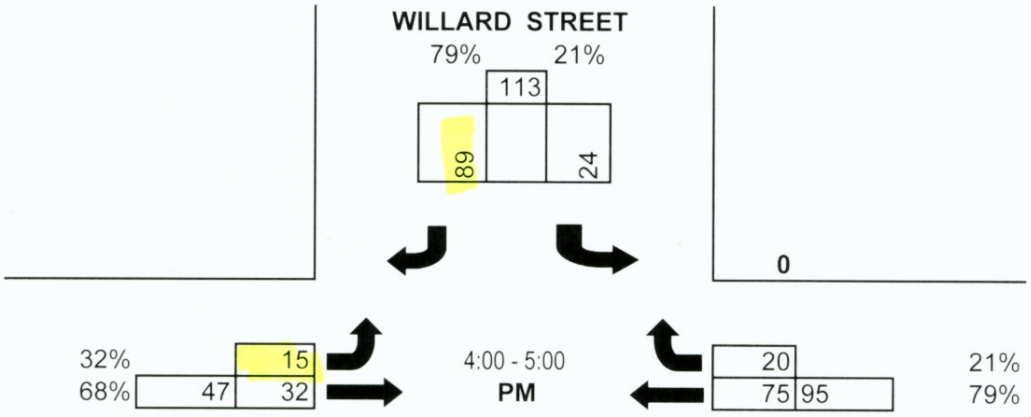
Grafton, MA - Wesson St. / Willard St. Existing
Turning Movements in One hour Starting with 7:15 AM
Tuesday February 11, 2020



WESSON STREET

Total Hour
Volume= 454

Turning Movements in One hour Starting with 4:00 PM
Tuesday February 11, 2020



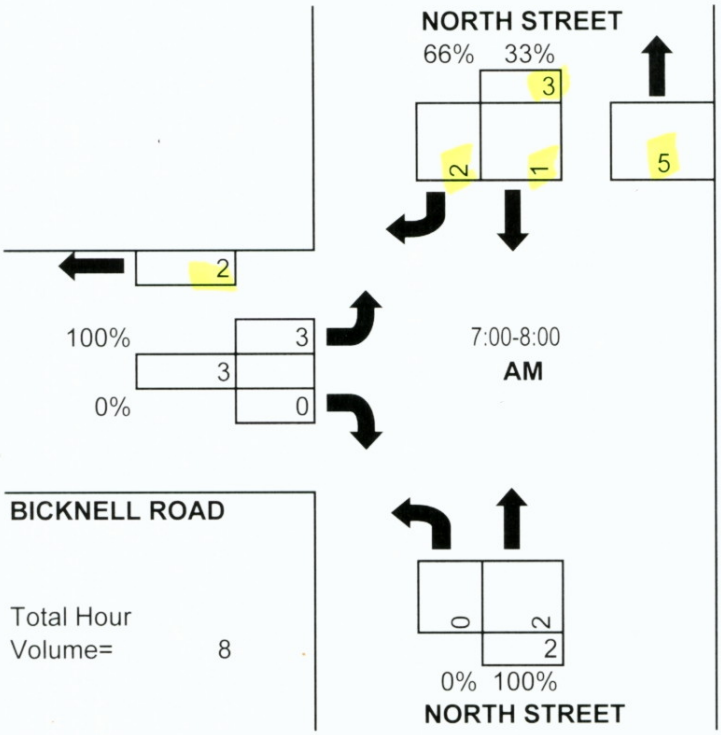
WESSON STREET

Total Hour
Volume= 255

Compiled By:
Bristol Traffic and Transportation Consulting LLC

Peak Hour Turning Movement Count

Grafton, MA - North St. / Bicknell Rd. **Site Trips ONLY**
Turning Movements in One hour Starting with 7:00 AM



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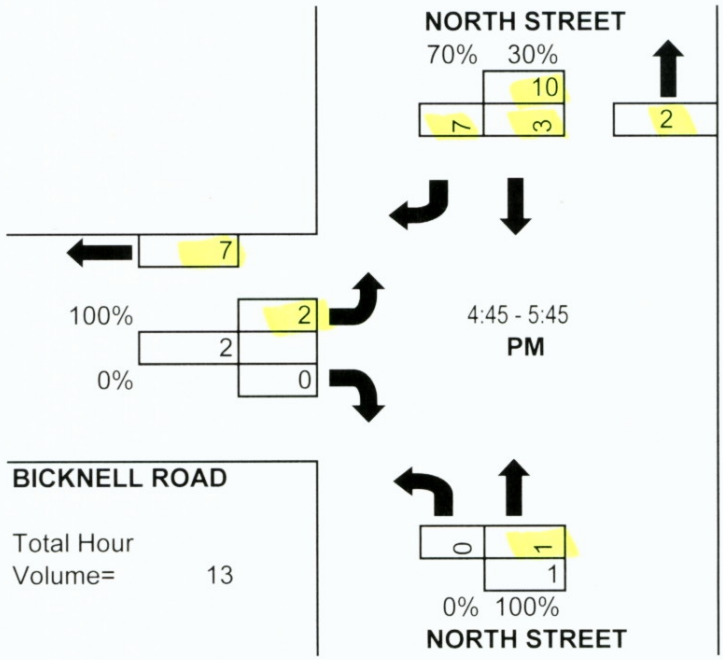

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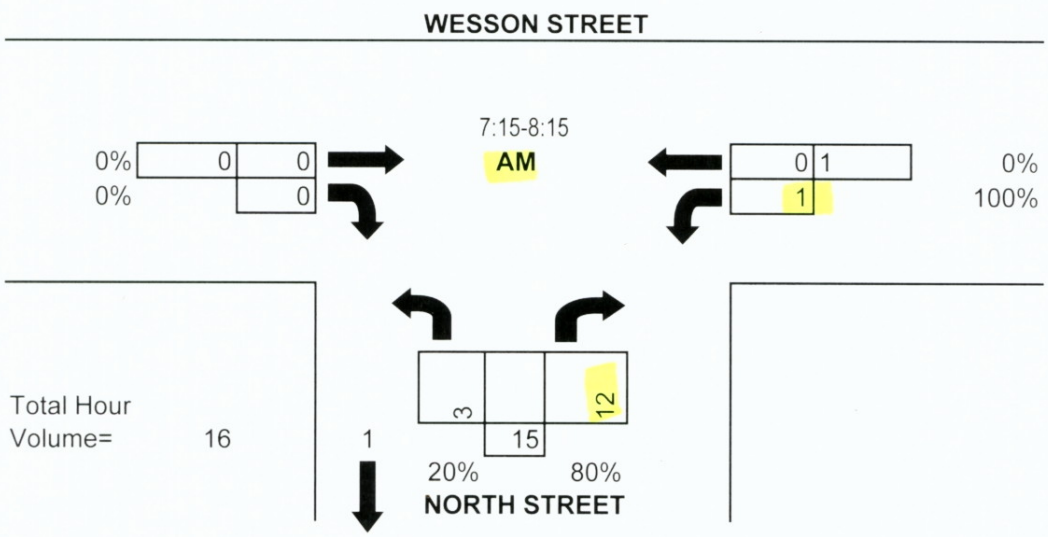
Peak Hour Turning Movement Count

Grafton, MA - Wesson St. / North St. Site Trips Only
Turning Movements in One hour Starting with 7:15 AM



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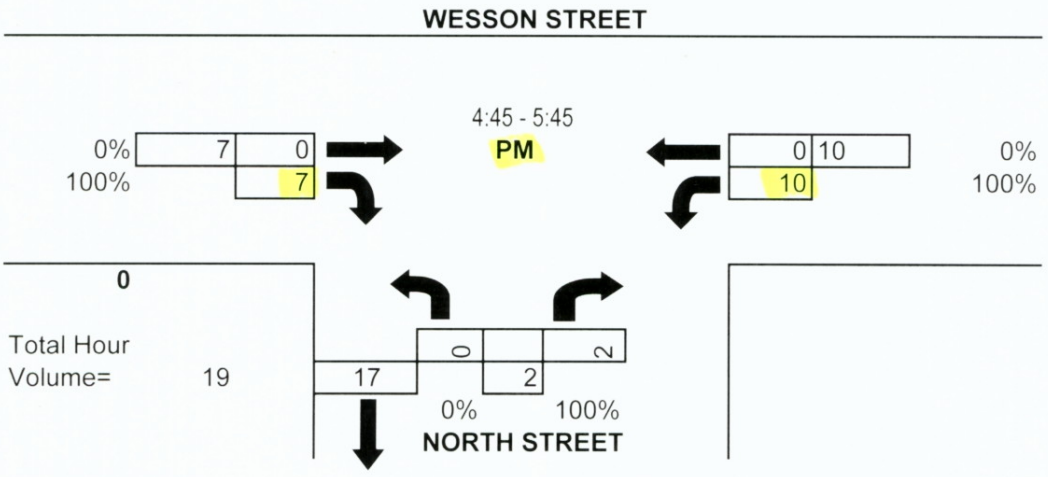
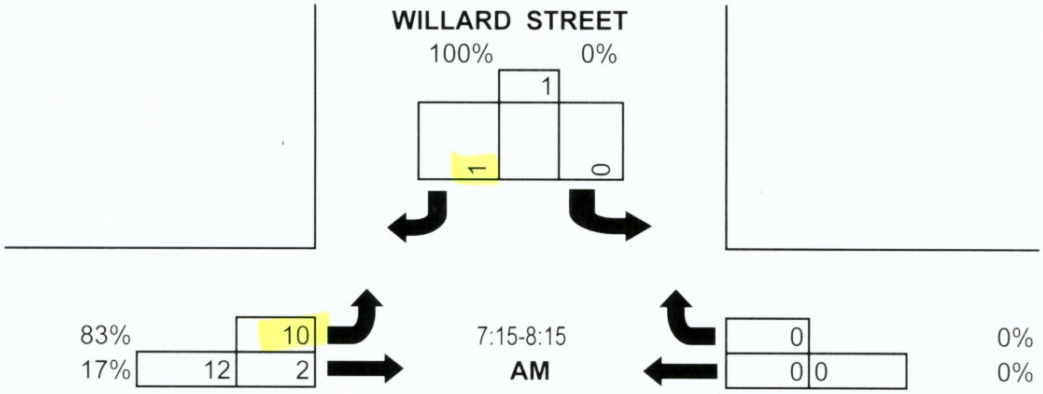


Compiled By:
Bristol Traffic and Transportation Consulting LLC

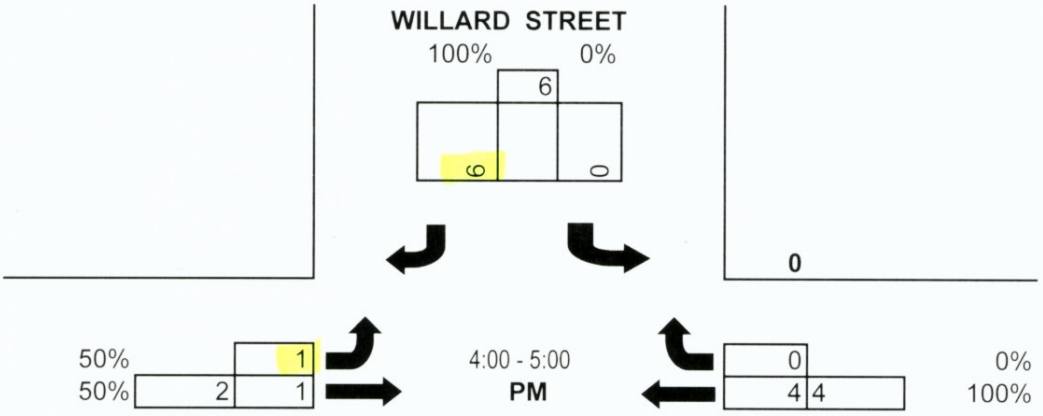
Peak Hour Turning Movement Count

Grafton, MA - Wesson St. / Willard St. **Site Trips Only**
Turning Movements in One hour Starting with 7:15 AM



Total Hour
Volume= 13

Turning Movements in One hour Starting with 4:00 PM

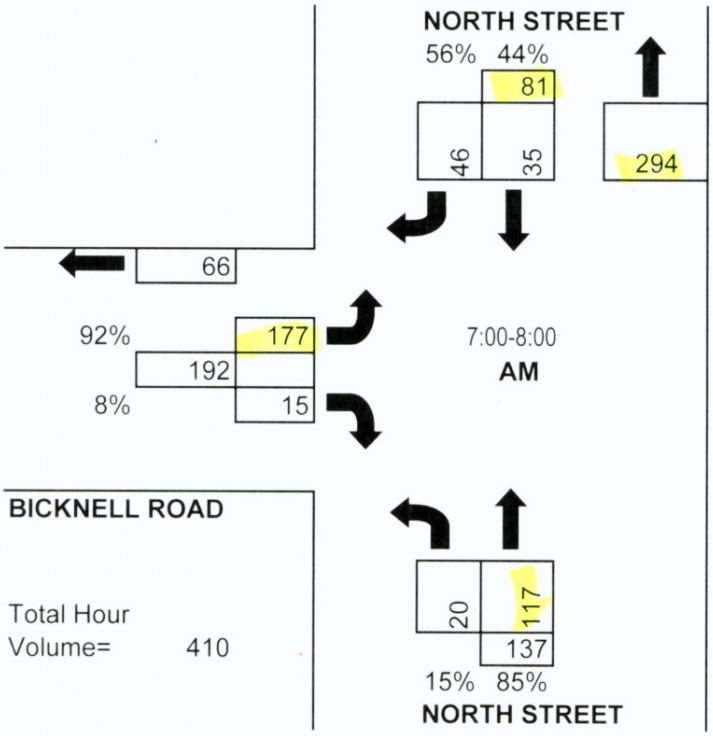


Total Hour
Volume= 12

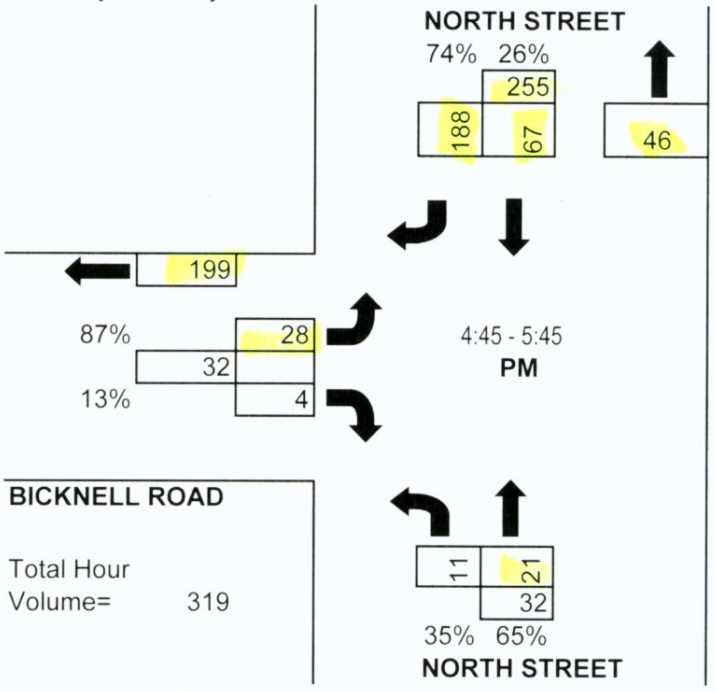
Compiled By:
Bristol Traffic and Transportation Consulting LLC

Peak Hour Turning Movement Count

Grafton, MA - North St. / Bicknell Rd. POST Construction
Turning Movements in One hour Starting with 7:00 AM
Tuesday February 11, 2020



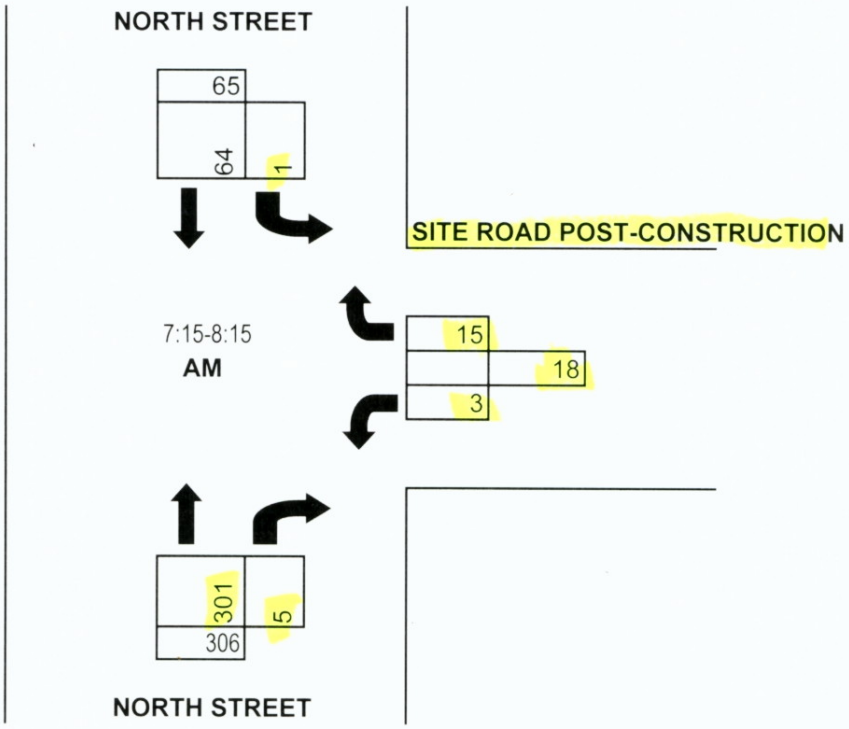
Turning Movements in One hour Starting with 4:45 PM
Tuesday February 11, 2020



Compiled By:
Bristol Traffic and Transportation Consulting LLC

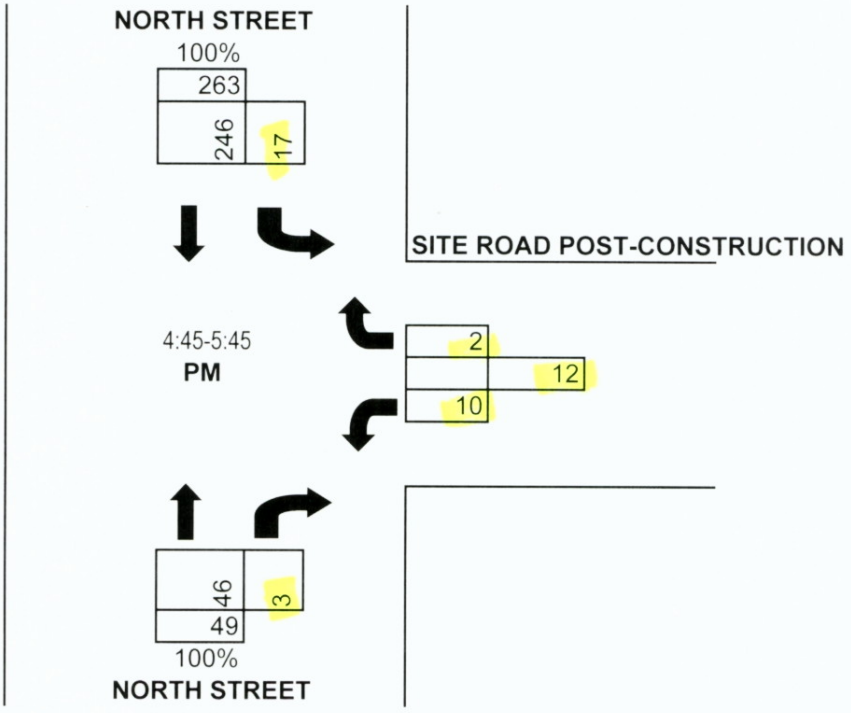
Peak Hour Turning Movement Count

Grafton MA - North St / Site Roadway POST Construction
Turning Movements in One hour Starting with 7:15 AM
Tuesday February 11, 2020



Total Hour
Volume= 389

Turning Movements in One hour Starting with 4:45 PM
Tuesday February 11, 2020

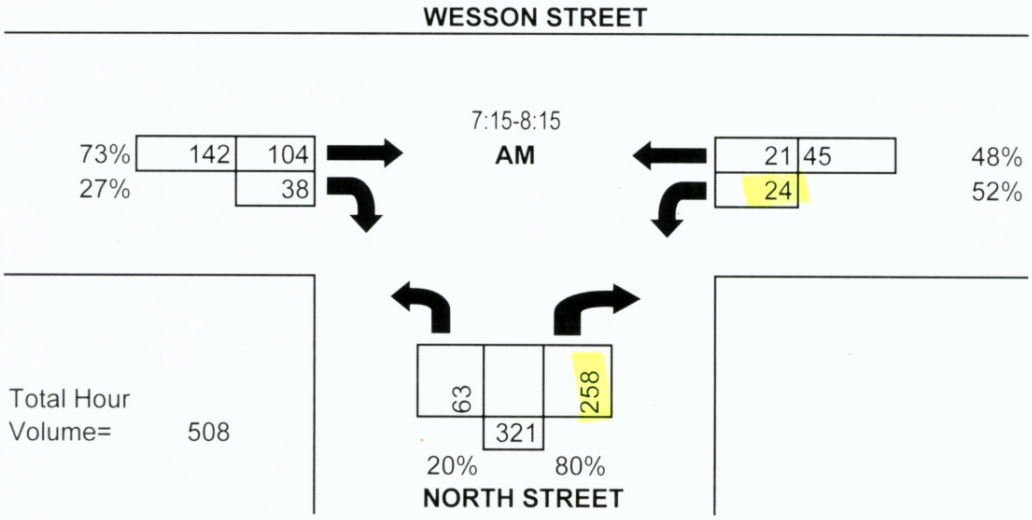


Total Hour
Volume= 324

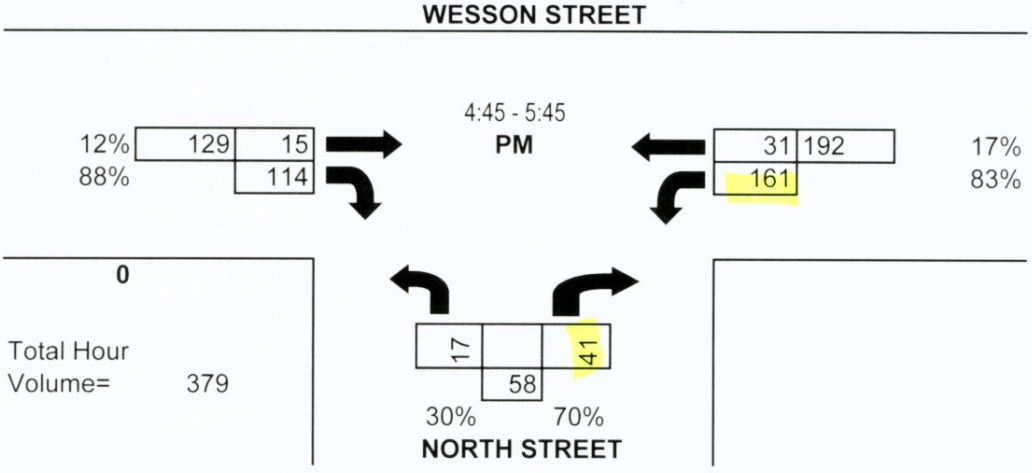
Compiled By:
Bristol Traffic and Transportation Consulting LLC

Peak Hour Turning Movement Count

Grafton, MA - Wesson St. / North St. POST Construction
Turning Movements in One hour Starting with 7:15 AM
Tuesday February 11, 2020



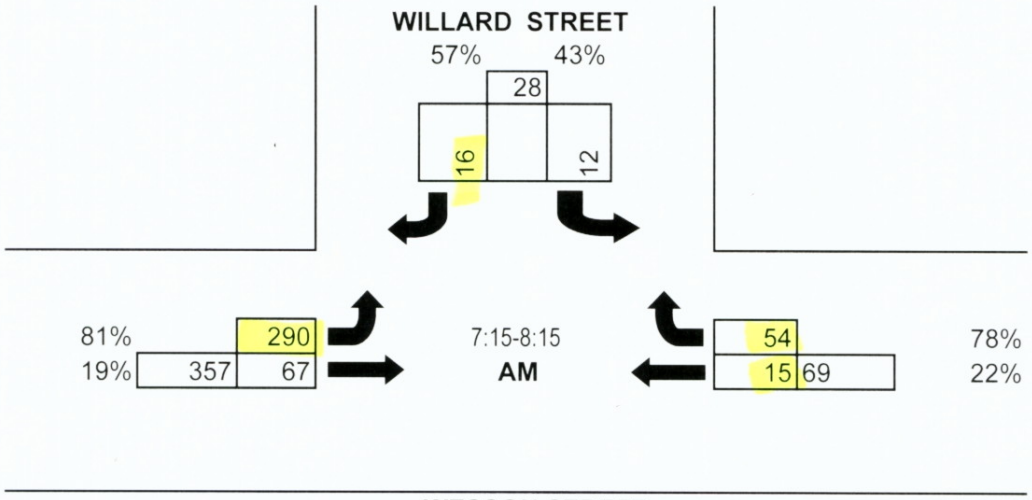
Turning Movements in One hour Starting with 4:45 PM
Tuesday February 11, 2020



Compiled By:
Bristol Traffic and Transportation Consulting LLC

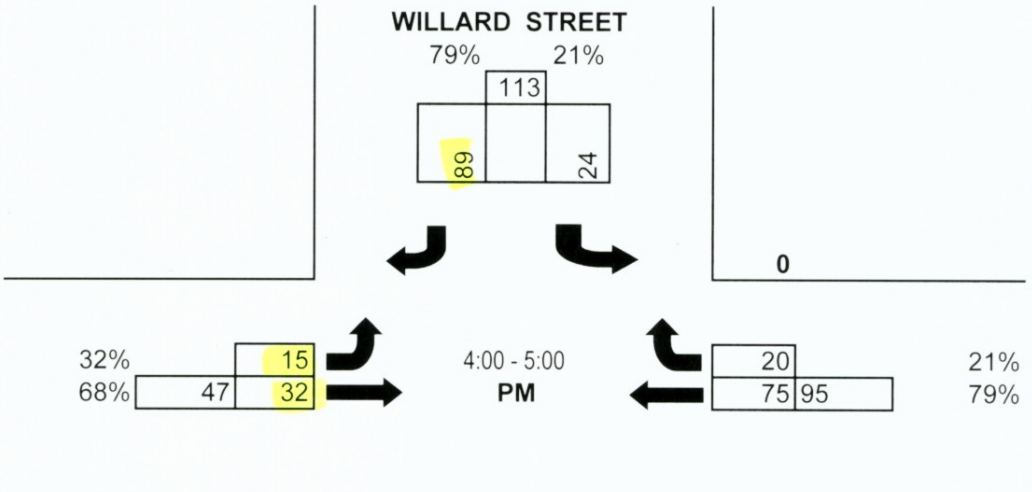
Peak Hour Turning Movement Count

Grafton, MA - Wesson St. / Willard St. POST Construction
Turning Movements in One hour Starting with 7:15 AM
TUESDAY February 11, 2020



Total Hour
Volume= 454

Turning Movements in One hour Starting with 4:00 PM
TUESDAY February 11, 2020



Total Hour
Volume= 255

Compiled By:
Bristol Traffic and Transportation Consulting LLC

Proposed Subdivision Roadways

Intersections at Existing
North Street & Magnolia Lane
Grafton, MA

Intersections Site Distance Analysis

May 6, 2019

Prepared for:

Circle Assets, LLC
291 Main Street, Suite 8
Northborough, MA 01532

Prepared by:

BRISTOL TRAFFIC
&
TRANSPORTATION CONSULTING LLC
Traffic Studies, Roadway Designs, Intersection Improvements, Site Designs

61 Hillsville Road
N. Brookfield, MA 01535
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TABLE OF CONTENTS

1. INTRODUCTION

1.1 Scope of Analysis

This report documents the findings and conclusions of a sight distance analysis conducted for a proposed preliminary residential subdivision roadway access to North Street and Magnolia Lane as well as an emergency only access/egress to Wesson Street, each located in Grafton, MA. Two preliminary plans for the subdivision are being submitted to the town planning board for review. One plan is a standard subdivision layout with single access points to both North Street and Magnolia Lane roadways. The second plan is for a reduced house lot sized Flex Plan footprint layout that creates significantly larger areas dedicated to open space. The second plan utilizes access to Magnolia Lane and North Street at the same locations as the first plan. However the second plan also includes an emergency only access way creating a site intersection onto Wesson Street that will be restricted from day to day use by the residents of this proposed subdivision option. This emergency access/egress is to be provided due to the creation of a cul-de-sac road layout that provides an emergency access/egress roadway from the cul-de-sac to Wesson Street only should the main access to North Street be temporarily unusable.

1.2 Sight Distance Measurement Reference Sources

Sight distance available for the vehicles approaching the proposed subdivision road intersections and available for the vehicles exiting the subdivision roadways onto North Street, Magnolia Lane and at the potential emergency exit location on Wesson Street were each field measured. These measurements were taken in accordance with requirements in both the American Association of State Highway and Transportation Officials (AASHTO) publication titled A Policy on Geometric Design of Highways and Streets, 2018, 7th Edition and also included in the Massachusetts Department of Transportation (MassDOT) Highway Division publication titled 2006 Massachusetts Highway Department Project Development & Design Guide, that quotes the requirements from the same AASHTO document. These are the guidelines currently used to determine available sight distances and standards for providing required stopping sight distances for safety at intersections and along continuous roadway segments.

Stop lines are not mandatory at side street intersections with stop sign control. Stop line locations, when used, are established in the Federal

Highway Administration (FHWA) 2009 publication titled the Manual of Uniform Traffic Control Devices (MUTCD), with revisions in 2012.

2. REFERENCE SOURCE MEASUREMENT METHODOLOGIES AND RECOMMENDED SIGHT DISTANCES

2.1 AASHTO Stopping Sight Distance (SSD)

Drivers approaching an intersection or any obstacle encountered on a roadway require time to recognize that the object (or vehicle) that is in it's travel path is a hazard necessary to react to. They also require the time needed to actually apply the brakes and either slow or stop the vehicle at a reasonable deceleration rate (not skidding or an uncomfortably harsh stopping maneuver). This total time is known as the perception and reaction time plus actual braking time. During this time period the vehicle travels at the approach speed then stops safely or slows significantly enough to avoid the obstacle if provided with the appropriate length of sight distance.

This perception/reaction and stopping distance length traveled before coming to a stop is dependent on the speed the vehicle is traveling and the available length of visibility on the through roadway. North Street has a 30 MPH speed limit posted that requires a car to have 200 feet of available stopping sight distance to safely stop on wet pavement, with average tire tread, without an excessively aggressive stopping maneuver. The two other streets analyzed, Wesson Street and Magnolia Drive, lack speed signage and based on the close spacing of the housing units and width of roadways, it is assumed 30 MPH is a reasonable speed for those roads as well.

The object height that AASHTO has determined to be the reasonable height for an approaching driver to spot and identify any object as a hazard to them, is 2.0 feet high, as measured above the road surface. This is the average height of a car headlight or tail light, so the approaching driver can avoid impact with a vehicle stopped in the approaching drivers lane. The height AASHTO defines as typical for the normal drivers eye above the road surface is 3.5 feet, and is used to measure stopping sight distance.

So this sets the method to measure available stopping sight distance on any non-stop controlled approach to an intersection or on a continuous roadway. The sight line needs to be clear from 3.5 ft for the driver eye

height looking for an object 2 feet above the lane surface, at any intersection or along the through roadway.

This measurement is taken in the field for all through, uncontrolled approaches to verify that vertical curvature of the road surface or a horizontal curve do not create a high point or side of road blockage within the required 200 foot safe stopping distance for these roadways 30 MPH approach speed. (see Table 3-1 in Appendix)

2.2 AASHTO Intersection Sight Distance (ISD)

Intersection sight distance is described in the AASHTO Policy publication Section 9.5. (see Appendix for pertinent pages from this section).

Intersection sight distance (ISD) is measured differently than Stopping Sight Distance (SSD) and the method will be described here.

An important point made in the AASHTO policy and also repeated in the MassDOT Highway guide book, is included in the Appendix, the fourth paragraph on Page 9-35, which is in Section 9.5.1, General Conditions. The AASHTO paragraph states "If the available sight distance for an entering or crossing vehicle is at least equal to the appropriate stopping sight distance for the major road, then drivers have sufficient sight distance to anticipate and avoid collisions. However, in some cases, a major-road vehicle may need to slow or stop to accommodate the maneuver by the minor road vehicle. To enhance traffic operations, intersection sight distances that exceed stopping sight distances are desirable along the major road." This defines the minimum ISD that is safe and equal to the SSD. In our case that SSD is 200 feet for 30 MPH.

Keep in mind that the subdivision road intersections with town roads will have side street stop sign controls so side road vehicles will stop to look for oncoming vehicles. Section 9.5 covers all types of intersection controls from no stops on four legs to 4-way stop or side road only stops.

ISD is measured from the driver's eye height on the side street to the drivers eye height of the approaching vehicle. Both are set at 3.5 feet above the road. This indicates that if the stopped side road vehicle driver can see the oncoming vehicle then the oncoming vehicle can also see the side road vehicle. Additionally, the side road vehicle is assumed to be set back from the edge of travel way of the through road. The set back distance a majority of vehicles stop on side roads was found to be "6.5 ft or less" from front grill of car to edge of through roadway. This places the

drivers eye an additional 8 ft from the front grill of the stopped car for the majority of cars in the US. So measurements are made from 14.5 ft from edge of roadway to the left and right looking at the middle of the approaching lane, to determine the intersection sight distance (ISD) available.

The MUTCD reference publication produced by the Federal Highway Administration (FHWA) states that stop line stripes should be placed 4 ft from crosswalks or 4 ft from an edge of road, with the option of being farther away on side roads if conditions dictate. For the proposed new subdivision road intersections at North Street, Magnolia Lane and for the Flex option plan also at Wesson Street, the proposal is to place the stop lines at 4 ft from edge of through roadway. In the above AASHTO recommended location for measuring the sight triangle the car will be assumed to stop with the front grill 2.5 ft prior to the stop line.

AASHTO recommends an ISD for a stopped vehicle turning left onto a 30 mph through roadway to be 335 ft (See Table 9-7 in the appendix) for operational efficiency, not safety reasons. They recommend an ISD for a stopped vehicle turning right onto a 30 MPH roadway to be 290 ft (see Table 9-9 in the appendix) for operational efficiency.

3. MEASURED SIGHT DISTANCES AT PROPOSED NEW INTERSECTIONS

3.1 Subdivision Road at Magnolia Lane

3.1.1 Stopping Sight Distance (SSD) measured from the northwest (left) is greater than 500 feet. Measured from the southeast (right) it is 265 feet. Both exceed the 200 foot safety standard by AASHTO for 30 MPH.

3.1.2 Intersection Sight Distance (ISD) measured for a car turning left is greater than 400 feet to the northwest (left) and is 360 feet to the east, both exceeding the AASHTO desirable 335 feet. For a car turning right the ISD is greater than 400 feet to the northwest (left) that exceeds the desirable 290 feet listed by AASHTO.

3.2 Subdivision Emergency Only Road at Wesson Street (Flex Plan Only)

3.2.1 Stopping Sight Distance (SSD) measured from the West is greater than 500 feet. Measured from the east (right) it is greater than 500 feet. Both exceed the 200 foot safety standard by AASHTO.

3.2.2 Intersection Sight Distance (ISD) measured for a car turning right is greater than 500 feet to the left, which exceeds the AASHTO desirable 290 foot line of sight. For a car turning left the sight line to the left is greater than 500 feet, which exceeds the AASHTO desirable 335 feet and to the right the sight line is approximately 130 feet at the 14.5 foot setback from edge of road to grill of car. However if the car pulls forward 2.5 feet so the grill is at the stop line 4 feet from the edge of road, the sight line to the east increases to 350 feet which exceeds to AASHTO desirable distance for operational efficiency.

Keeping in mind that in an unlikely event that North Street roadway intersection becomes inaccessible for a period, then and only then would the Wesson Street emergency roadway be used.

3.3 Subdivision Road at North Street

3.1.1 Stopping Sight Distance (SSD) measured from the south (left) is greater than 500 feet. Measured from the north (right) it is 315 feet. Both exceed the 200 foot AASHTO safety standard for the approaching car to be able to safely stop, should that become necessary.

3.1.2 Intersection Sight Distance (ISD) measured for a car turning left is 167 feet to the south and 350 feet to the north, exceeding the desirable 335 feet to the north. However if the side street car moves forward so the car front grill is at the stop line, 4 ft from the edge of road, instead of stopping "6.5 feet or less" as the average distance was established by AASHTO, the vehicle is still not close to the road edge with 4 feet of distance between the car and pavement. Then the (ISD) sight line to the south increases to be the AASHTO desirable 335 feet for operational efficiency, not for safety. Should the car move so the front tires are at the stop line, the line of sight is increased further to 510 feet. This is with the grill of the car still 1.5 to 2 feet from the road pavement.

The reason the sight line to the south is reduced when the car grill is the 6.5 feet from the road pavement is the existing concrete parapet post for the bridge over the Mass Turnpike to the south. Moving the car forward only 2.5 feet allows the driver sitting 8 feet behind the grill of the average car to see in front of the concrete post to the full 335 feet desirable sight line.

4. STUDY CONCLUSIONS

The study indicates that each of the three potential subdivision roadway intersections with existing town roads provide adequate intersection and stopping site distances that will not put the through vehicles or the side street vehicles in danger. As AASHTO reference states the Stopping Site Distance is the most important criteria and each intersection satisfies that distance. A secondary sight distance is the intersection sight distance that is desirable to enhance traffic operations. However their statement as quoted in the report does make it clear that if the side street vehicle driver has available to them the Stopping Sight Distance needed for the oncoming vehicle to stop, then drivers have sufficient sight distance to anticipate and avoid collisions.

Another finding is that the AASHTO assumed average stopping location distance from the main road being “6.5 feet or less” therefore the distance has been set at 6.5 feet for the front of the car and the driver is typically another 8 feet back from the front of the vehicle, so totaling 14.5 feet. This distance assumes that the front grill of the car is at minimum 2 feet from the stop line which is set at 4 feet from the through street edge. If the car pulls forward to the stop line in each of these intersections the Intersection Sight Distance is available so traffic operations can be enhanced at that stopping point.

Overall the review and field measurements indicate that the sight distances available are sufficient to avoid collisions and improve operational efficiency at all three of the potential intersections.

APPENDIX

AASHTO Excerpts and Tables listing desirable distances, from Key Subsections referenced in report.

Subsection 3.2.2 Stopping Sight Distance text.
Table 3-1 SSD for safety based on speed.
Subsection 9.5 Intersection Sight Distance text.
Table 9-7 ISD for Left Turn Vehicle from Stop.
Table 9-9 ISD for Right Turn Vehicle from Stop.

PDI File #: **207442 B**
Location: **N: North Street S: North Street**
Location: **E: Driveway W: Bicknell Road**
City, State: **Grafton, MA**
Client: **Bristol Traffic/L.Bristol**
Site Code: **21900102**
Count Date: **Tuesday, February 11, 2020**
Start Time: **6:00 AM**
End Time: **9:00 AM**
Class:

AM

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

AM

Cars and Heavy Vehicles (Combined)

AM

	North Street from North					Driveway from East					North Street from South					Bicknell Road from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
6:00 AM	3	2	0	0	5	0	0	0	0	0	0	2	0	0	2	0	0	5	0	5	12
6:15 AM	4	1	0	0	5	0	1	0	0	1	0	13	2	0	15	1	0	18	0	19	40
6:30 AM	4	4	0	0	8	0	0	0	0	0	0	14	2	0	16	0	0	15	0	15	39
6:45 AM	7	3	0	0	10	0	0	0	0	0	0	24	4	0	28	1	0	21	0	22	60
Total	18	10	0	0	28	0	1	0	0	1	0	53	8	0	61	2	0	59	0	61	151
7:00 AM	20	4	0	0	24	0	0	0	0	0	0	15	8	0	23	0	0	15	0	15	62
7:15 AM	13	8	0	0	21	0	0	0	0	0	0	39	4	0	43	5	0	33	0	38	102
7:30 AM	5	6	0	0	11	0	0	0	0	0	0	21	2	0	23	3	0	52	0	55	89
7:45 AM	6	16	0	0	22	0	0	0	0	0	0	40	6	0	46	7	0	74	0	81	149
Total	44	34	0	0	78	0	0	0	0	0	0	115	20	0	135	15	0	174	0	189	402
8:00 AM	4	7	0	0	11	0	0	0	0	0	0	10	4	0	14	0	0	30	0	30	55
8:15 AM	6	4	0	0	10	0	1	0	0	1	0	16	3	0	19	1	0	16	0	17	47
8:30 AM	6	3	0	0	9	0	0	0	0	0	0	5	3	0	8	1	0	13	0	14	31
8:45 AM	5	5	0	0	10	0	0	0	0	0	0	15	5	0	20	0	0	11	0	11	41
Total	21	19	0	0	40	0	1	0	0	1	0	46	15	0	61	2	0	70	0	72	174
Grand Total	83	63	0	0	146	0	2	0	0	2	0	214	43	0	257	19	0	303	0	322	727
Approach %	56.8	43.2	0.0	0.0		0.0	100.0	0.0	0.0		0.0	83.3	16.7	0.0		5.9	0.0	94.1	0.0		
Total %	11.4	8.7	0.0	0.0	20.1	0.0	0.3	0.0	0.0	0.3	0.0	29.4	5.9	0.0	35.4	2.6	0.0	41.7	0.0	44.3	
Exiting Leg Total					517					0					82					128	727
Cars	82	57	0	0	139	0	2	0	0	2	0	208	42	0	250	18	0	301	0	319	710
% Cars	98.8	90.5	0.0	0.0	95.2	0.0	100.0	0.0	0.0	100.0	0.0	97.2	97.7	0.0	97.3	94.7	0.0	99.3	0.0	99.1	97.7
Exiting Leg Total					509					0					75					126	710
Heavy Vehicles	1	6	0	0	7	0	0	0	0	0	0	6	1	0	7	1	0	2	0	3	17
% Heavy Vehicles	1.2	9.5	0.0	0.0	4.8	0.0	0.0	0.0	0.0	0.0	0.0	2.8	2.3	0.0	2.7	5.3	0.0	0.7	0.0	0.9	2.3
Exiting Leg Total					8					0					7					2	17

Peak Hour Analysis from 06:00 AM to 09:00 AM begins at:

7:00 AM	North Street from North					Driveway from East					North Street from South					Bicknell Road from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	20	4	0	0	24	0	0	0	0	0	0	15	8	0	23	0	0	15	0	15	62
7:15 AM	13	8	0	0	21	0	0	0	0	0	0	39	4	0	43	5	0	33	0	38	102
7:30 AM	5	6	0	0	11	0	0	0	0	0	0	21	2	0	23	3	0	52	0	55	89
7:45 AM	6	16	0	0	22	0	0	0	0	0	0	40	6	0	46	7	0	74	0	81	149
Total Volume	44	34	0	0	78	0	0	0	0	0	0	115	20	0	135	15	0	174	0	189	402
% Approach Total	56.4	43.6	0.0	0.0		0.0	0.0	0.0	0.0		0.0	85.2	14.8	0.0		7.9	0.0	92.1	0.0		
PHF	0.550	0.531	0.000	0.000	0.813	0.000	0.000	0.000	0.000	0.000	0.000	0.719	0.625	0.000	0.734	0.536	0.000	0.588	0.000	0.583	0.674
Cars	44	30	0	0	74	0	0	0	0	0	0	113	20	0	133	14	0	173	0	187	394
Cars %	100.0	88.2	0.0	0.0	94.9	0.0	0.0	0.0	0.0	0.0	0.0	98.3	100.0	0.0	98.5	93.3	0.0	99.4	0.0	98.9	98.0
Heavy Vehicles	0	4	0	0	4	0	0	0	0	0	0	2	0	0	2	1	0	1	0	2	8
Heavy Vehicles %	0.0	11.8	0.0	0.0	5.1	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.0	0.0	1.5	6.7	0.0	0.6	0.0	1.1	2.0
Cars Enter Leg	44	30	0	0	74	0	0	0	0	0	0	113	20	0	133	14	0	173	0	187	394
Heavy Enter Leg	0	4	0	0	4	0	0	0	0	0	0	2	0	0	2	1	0	1	0	2	8
Total Entering Leg	44	34	0	0	78	0	0	0	0	0	0	115	20	0	135	15	0	174	0	189	402
Cars Exiting Leg					286					0					44					64	394
Heavy Exiting Leg					3					0					5					0	8
Total Exiting Leg					289					0					49					64	402

PDI File #: **207442 B**
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Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Cars

	North Street from North					Driveway from East					North Street from South					Bicknell Road from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
6:00 AM	3	2	0	0	5	0	0	0	0	0	0	2	0	0	2	0	0	5	0	5	12
6:15 AM	4	1	0	0	5	0	1	0	0	1	0	11	2	0	13	1	0	18	0	19	38
6:30 AM	4	3	0	0	7	0	0	0	0	0	0	14	2	0	16	0	0	15	0	15	38
6:45 AM	6	2	0	0	8	0	0	0	0	0	0	24	4	0	28	1	0	21	0	22	58
Total	17	8	0	0	25	0	1	0	0	1	0	51	8	0	59	2	0	59	0	61	146
7:00 AM	20	4	0	0	24	0	0	0	0	0	0	14	8	0	22	0	0	14	0	14	60
7:15 AM	13	5	0	0	18	0	0	0	0	0	0	38	4	0	42	4	0	33	0	37	97
7:30 AM	5	5	0	0	10	0	0	0	0	0	0	21	2	0	23	3	0	52	0	55	88
7:45 AM	6	16	0	0	22	0	0	0	0	0	0	40	6	0	46	7	0	74	0	81	149
Total	44	30	0	0	74	0	0	0	0	0	0	113	20	0	133	14	0	173	0	187	394
8:00 AM	4	7	0	0	11	0	0	0	0	0	0	10	4	0	14	0	0	30	0	30	55
8:15 AM	6	4	0	0	10	0	1	0	0	1	0	15	3	0	18	1	0	16	0	17	46
8:30 AM	6	3	0	0	9	0	0	0	0	0	0	5	3	0	8	1	0	12	0	13	30
8:45 AM	5	5	0	0	10	0	0	0	0	0	0	14	4	0	18	0	0	11	0	11	39
Total	21	19	0	0	40	0	1	0	0	1	0	44	14	0	58	2	0	69	0	71	170
Grand Total	82	57	0	0	139	0	2	0	0	2	0	208	42	0	250	18	0	301	0	319	710
Approach %	59.0	41.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	83.2	16.8	0.0		5.6	0.0	94.4	0.0		
Total %	11.5	8.0	0.0	0.0	19.6	0.0	0.3	0.0	0.0	0.3	0.0	29.3	5.9	0.0	35.2	2.5	0.0	42.4	0.0	44.9	
Exiting Leg Total					509					0					75					126	710

Peak Hour Analysis from 06:00 AM to 09:00 AM begins at:

7:00 AM	North Street from North					Driveway from East					North Street from South					Bicknell Road from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	20	4	0	0	24	0	0	0	0	0	0	14	8	0	22	0	0	14	0	14	60
7:15 AM	13	5	0	0	18	0	0	0	0	0	0	38	4	0	42	4	0	33	0	37	97
7:30 AM	5	5	0	0	10	0	0	0	0	0	0	21	2	0	23	3	0	52	0	55	88
7:45 AM	6	16	0	0	22	0	0	0	0	0	0	40	6	0	46	7	0	74	0	81	149
Total Volume	44	30	0	0	74	0	0	0	0	0	0	113	20	0	133	14	0	173	0	187	394
% Approach Total	59.5	40.5	0.0	0.0		0.0	0.0	0.0	0.0		0.0	85.0	15.0	0.0		7.5	0.0	92.5	0.0		
PHF	0.550	0.469	0.000	0.000	0.771	0.000	0.000	0.000	0.000	0.000	0.000	0.706	0.625	0.000	0.723	0.500	0.000	0.584	0.000	0.577	0.661
Entering Leg	44	30	0	0	74	0	0	0	0	0	0	113	20	0	133	14	0	173	0	187	394
Exiting Leg					286					0					44					64	394
Total					360					0					177					251	788

PDI File #: **207442 B**
Location: **N: North Street S: North Street**
Location: **E: Driveway W: Bicknell Road**
City, State: **Grafton, MA**
Client: **Bristol Traffic/L.Bristol**
Site Code: **21900102**
Count Date: **Tuesday, February 11, 2020**
Start Time: **6:00 AM**
End Time: **9:00 AM**

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Class: **Heavy Vehicles-Combined (Buses, Single-Unit Trucks, Articulated Trucks)**

	North Street from North					Driveway from East					North Street from South					Bicknell Road from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
6:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15 AM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	2
6:30 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
6:45 AM	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	1	2	0	0	3	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	5
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	2
7:15 AM	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	1	0	0	0	1	5
7:30 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	4	0	0	4	0	0	0	0	0	0	2	0	0	2	1	0	1	0	2	8
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	2
Total	0	0	0	0	0	0	0	0	0	0	0	2	1	0	3	0	0	1	0	1	4
Grand Total	1	6	0	0	7	0	0	0	0	0	0	6	1	0	7	1	0	2	0	3	17
Approach %	14.3	85.7	0.0	0.0		0.0	0.0	0.0	0.0		0.0	85.7	14.3	0.0		33.3	0.0	66.7	0.0		
Total %	5.9	35.3	0.0	0.0	41.2	0.0	0.0	0.0	0.0	0.0	0.0	35.3	5.9	0.0	41.2	5.9	0.0	11.8	0.0	17.6	
Exiting Leg Total					8					0					7					2	17
Buses	1	6	0	0	7	0	0	0	0	0	0	4	0	0	4	1	0	2	0	3	14
% Buses	100.0	100.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	66.7	0.0	0.0	57.1	100.0	0.0	100.0	0.0	100.0	82.4
Exiting Leg Total					6					0					7					1	14
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	2	1	0	3	0	0	0	0	0	3
% Single-Unit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	100.0	0.0	42.9	0.0	0.0	0.0	0.0	0.0	17.6
Exiting Leg Total					2					0					0					1	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exiting Leg Total					0					0					0					0	0

Peak Hour Analysis from 06:00 AM to 09:00 AM begins at:

6:30 AM	North Street from North					Driveway from East					North Street from South					Bicknell Road from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
6:30 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
6:45 AM	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	2
7:15 AM	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	1	0	0	0	1	5
Total Volume	1	5	0	0	6	0	0	0	0	0	0	2	0	0	2	1	0	1	0	2	10
% Approach Total	16.7	83.3	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		50.0	0.0	50.0	0.0		
PHF	0.250	0.417	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.000	0.000	0.500	0.250	0.000	0.250	0.000	0.500	0.500
Buses	1	5	0	0	6	0	0	0	0	0	0	1	0	0	1	1	0	1	0	2	9
Buses %	100.0	100.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	50.0	100.0	0.0	100.0	0.0	100.0	90.0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
Single-Unit %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	10.0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Buses	1	5	0	0	6	0	0	0	0	0	0	1	0	0	1	1	0	1	0	2	9
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Entering Leg	1	5	0	0	6	0	0	0	0	0	0	2	0	0	2	1	0	1	0	2	10
Buses					2					0					6					1	9
Single-Unit Trucks					1					0					0					0	1
Articulated Trucks					0					0					0					0	0
Total Exiting Leg					3					0					6					1	10

PDI File #: **207442 BB**
Location: **N: North Street S: North Street**
Location: **E: Driveway W: Bicknell Road**
City, State: **Grafton, MA**
Client: **Bristol Traffic/L.Bristol**
Site Code: **21900102**
Count Date: **Tuesday, February 11, 2020**
Start Time: **3:30 PM**
End Time: **6:30 PM**
Class:

PM

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Cars and Heavy Vehicles (Combined)

PM

	North Street from North					Driveway from East					North Street from South					Bicknell Road from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
3:30 PM	22	14	0	0	36	0	0	0	0	0	0	12	5	0	17	0	0	8	0	8	61
3:45 PM	17	10	0	0	27	0	0	0	0	0	0	6	5	0	11	1	0	1	0	2	40
Total	39	24	0	0	63	0	0	0	0	0	0	18	10	0	28	1	0	9	0	10	101
4:00 PM	30	12	0	0	42	0	0	0	0	0	0	7	4	0	11	0	1	11	0	12	65
4:15 PM	32	12	0	0	44	0	0	0	0	0	0	7	4	0	11	2	0	7	0	9	64
4:30 PM	29	18	0	0	47	0	0	0	0	0	0	9	5	0	14	4	0	6	0	10	71
4:45 PM	48	19	0	0	67	0	0	0	0	0	0	4	1	0	5	2	0	7	0	9	81
Total	139	61	0	0	200	0	0	0	0	0	0	27	14	0	41	8	1	31	0	40	281
5:00 PM	40	14	0	0	54	0	0	0	0	0	0	2	2	0	4	1	0	3	0	4	62
5:15 PM	44	12	0	0	56	0	0	0	0	0	0	9	4	0	13	1	0	9	0	10	79
5:30 PM	49	19	0	0	68	0	0	0	0	0	0	5	4	0	9	0	0	7	0	7	84
5:45 PM	32	17	0	0	49	0	0	0	0	0	0	10	2	0	12	3	0	7	0	10	71
Total	165	62	0	0	227	0	0	0	0	0	0	26	12	0	38	5	0	26	0	31	296
6:00 PM	22	8	0	0	30	0	0	0	0	0	0	7	3	0	10	1	0	4	0	5	45
6:15 PM	26	16	0	0	42	0	0	0	0	0	0	1	1	0	2	0	0	4	0	4	48
Total	48	24	0	0	72	0	0	0	0	0	0	8	4	0	12	1	0	8	0	9	93
Grand Total	391	171	0	0	562	0	0	0	0	0	0	79	40	0	119	15	1	74	0	90	771
Approach %	69.6	30.4	0.0	0.0		0.0	0.0	0.0	0.0		0.0	66.4	33.6	0.0		16.7	1.1	82.2	0.0		
Total %	50.7	22.2	0.0	0.0	72.9	0.0	0.0	0.0	0.0	0.0	0.0	10.2	5.2	0.0	15.4	1.9	0.1	9.6	0.0	11.7	
Exiting Leg Total					153					1					186					431	771
Cars	389	169	0	0	558	0	0	0	0	0	0	77	40	0	117	15	1	74	0	90	765
% Cars	99.5	98.8	0.0	0.0	99.3	0.0	0.0	0.0	0.0	0.0	0.0	97.5	100.0	0.0	98.3	100.0	100.0	100.0	0.0	100.0	99.2
Exiting Leg Total					151					1					184					429	765
Heavy Vehicles	2	2	0	0	4	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	6
% Heavy Vehicles	0.5	1.2	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.8
Exiting Leg Total					2					0					2					2	6

Peak Hour Analysis from 03:30 PM to 06:30 PM begins at:

4:45 PM	North Street from North					Driveway from East					North Street from South					Bicknell Road from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:45 PM	48	19	0	0	67	0	0	0	0	0	0	4	1	0	5	2	0	7	0	9	81
5:00 PM	40	14	0	0	54	0	0	0	0	0	0	2	2	0	4	1	0	3	0	4	62
5:15 PM	44	12	0	0	56	0	0	0	0	0	0	9	4	0	13	1	0	9	0	10	79
5:30 PM	49	19	0	0	68	0	0	0	0	0	0	5	4	0	9	0	0	7	0	7	84
Total Volume	181	64	0	0	245	0	0	0	0	0	0	20	11	0	31	4	0	26	0	30	306
% Approach Total	73.9	26.1	0.0	0.0		0.0	0.0	0.0	0.0		0.0	64.5	35.5	0.0		13.3	0.0	86.7	0.0		
PHF	0.923	0.842	0.000	0.000	0.901	0.000	0.000	0.000	0.000	0.000	0.000	0.556	0.688	0.000	0.596	0.500	0.000	0.722	0.000	0.750	0.911
Cars	181	64	0	0	245	0	0	0	0	0	0	20	11	0	31	4	0	26	0	30	306
Cars %	100.0	100.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	0.0	100.0	100.0	0.0	100.0	0.0	100.0	100.0
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Vehicles %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cars Enter Leg	181	64	0	0	245	0	0	0	0	0	0	20	11	0	31	4	0	26	0	30	306
Heavy Enter Leg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Entering Leg	181	64	0	0	245	0	0	0	0	0	0	20	11	0	31	4	0	26	0	30	306
Cars Exiting Leg					46					0					68					192	306
Heavy Exiting Leg					0					0					0					0	0
Total Exiting Leg					46					0					68					192	306

PDI File #: **207442 BB**
Location: **N: North Street S: North Street**
Location: **E: Driveway W: Bicknell Road**
City, State: **Grafton, MA**
Client: **Bristol Traffic/L.Bristol**
Site Code: **21900102**
Count Date: **Tuesday, February 11, 2020**
Start Time: **3:30 PM**
End Time: **6:30 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Cars

	North Street from North					Driveway from East					North Street from South					Bicknell Road from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
3:30 PM	21	14	0	0	35	0	0	0	0	0	0	12	5	0	17	0	0	8	0	8	60
3:45 PM	17	9	0	0	26	0	0	0	0	0	0	6	5	0	11	1	0	1	0	2	39
Total	38	23	0	0	61	0	0	0	0	0	0	18	10	0	28	1	0	9	0	10	99
4:00 PM	30	12	0	0	42	0	0	0	0	0	0	6	4	0	10	0	1	11	0	12	64
4:15 PM	32	12	0	0	44	0	0	0	0	0	0	7	4	0	11	2	0	7	0	9	64
4:30 PM	29	18	0	0	47	0	0	0	0	0	0	9	5	0	14	4	0	6	0	10	71
4:45 PM	48	19	0	0	67	0	0	0	0	0	0	4	1	0	5	2	0	7	0	9	81
Total	139	61	0	0	200	0	0	0	0	0	0	26	14	0	40	8	1	31	0	40	280
5:00 PM	40	14	0	0	54	0	0	0	0	0	0	2	2	0	4	1	0	3	0	4	62
5:15 PM	44	12	0	0	56	0	0	0	0	0	0	9	4	0	13	1	0	9	0	10	79
5:30 PM	49	19	0	0	68	0	0	0	0	0	0	5	4	0	9	0	0	7	0	7	84
5:45 PM	32	16	0	0	48	0	0	0	0	0	0	9	2	0	11	3	0	7	0	10	69
Total	165	61	0	0	226	0	0	0	0	0	0	25	12	0	37	5	0	26	0	31	294
6:00 PM	21	8	0	0	29	0	0	0	0	0	0	7	3	0	10	1	0	4	0	5	44
6:15 PM	26	16	0	0	42	0	0	0	0	0	0	1	1	0	2	0	0	4	0	4	48
Total	47	24	0	0	71	0	0	0	0	0	0	8	4	0	12	1	0	8	0	9	92
Grand Total	389	169	0	0	558	0	0	0	0	0	0	77	40	0	117	15	1	74	0	90	765
Approach %	69.7	30.3	0.0	0.0		0.0	0.0	0.0	0.0		0.0	65.8	34.2	0.0		16.7	1.1	82.2	0.0		
Total %	50.8	22.1	0.0	0.0	72.9	0.0	0.0	0.0	0.0	0.0	0.0	10.1	5.2	0.0	15.3	2.0	0.1	9.7	0.0	11.8	
Exiting Leg Total					151					1					184					429	765

Peak Hour Analysis from 03:30 PM to 06:30 PM begins at:

4:45 PM	North Street from North					Driveway from East					North Street from South					Bicknell Road from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:45 PM	48	19	0	0	67	0	0	0	0	0	0	4	1	0	5	2	0	7	0	9	81
5:00 PM	40	14	0	0	54	0	0	0	0	0	0	2	2	0	4	1	0	3	0	4	62
5:15 PM	44	12	0	0	56	0	0	0	0	0	0	9	4	0	13	1	0	9	0	10	79
5:30 PM	49	19	0	0	68	0	0	0	0	0	0	5	4	0	9	0	0	7	0	7	84
Total Volume	181	64	0	0	245	0	0	0	0	0	0	20	11	0	31	4	0	26	0	30	306
% Approach Total	73.9	26.1	0.0	0.0		0.0	0.0	0.0	0.0		0.0	64.5	35.5	0.0		13.3	0.0	86.7	0.0		
PHF	0.923	0.842	0.000	0.000	0.901	0.000	0.000	0.000	0.000	0.000	0.000	0.556	0.688	0.000	0.596	0.500	0.000	0.722	0.000	0.750	0.911
Entering Leg	181	64	0	0	245	0	0	0	0	0	0	20	11	0	31	4	0	26	0	30	306
Exiting Leg					46					0					68					192	306
Total					291					0					99					222	612

PDI File #: **207442 BB**
Location: **N: North Street S: North Street**
Location: **E: Driveway W: Bicknell Road**
City, State: **Grafton, MA**
Client: **Bristol Traffic/L.Bristol**
Site Code: **21900102**
Count Date: **Tuesday, February 11, 2020**
Start Time: **3:30 PM**
End Time: **6:30 PM**

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Class: **Heavy Vehicles-Combined (Buses, Single-Unit Trucks, Articulated Trucks)**

	North Street from North					Driveway from East					North Street from South					Bicknell Road from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
3:30 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
3:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
Total	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
6:00 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
6:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Grand Total	2	2	0	0	4	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	6
Approach %	50.0	50.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		
Total %	33.3	33.3	0.0	0.0	66.7	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0	33.3	0.0	0.0	0.0	0.0	0.0	
Exiting Leg Total					2					0					2					2	6
Buses	1	1	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
% Buses	50.0	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	50.0
Exiting Leg Total					1					0					1					1	3
Single-Unit Trucks	1	1	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
% Single-Unit	50.0	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	50.0
Exiting Leg Total					1					0					1					1	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exiting Leg Total					0					0					0					0	0

Peak Hour Analysis from 03:30 PM to 06:30 PM begins at:

3:30 PM	North Street from North					Driveway from East					North Street from South					Bicknell Road from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
3:30 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
3:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	1	1	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
% Approach Total	50.0	50.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		
PHF	0.250	0.250	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.750
Buses	1	1	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
Buses %	100.0	100.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Buses	1	1	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
Single-Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Entering Leg	1	1	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
Buses					1					0					1					1	3
Single-Unit Trucks					0					0					0					0	0
Articulated Trucks					0					0					0					0	0
Total Exiting Leg					1					0					1					1	3

PDI File #: **207442 A**
Location: **S: North Street**
Location: **E: Wesson Street W: Wesson Street**
City, State: **Grafton, MA**
Client: **Bristol Traffic/L.Bristol**
Site Code: **21900102**
Count Date: **Tuesday, February 11, 2020**
Start Time: **6:00 AM**
End Time: **9:00 AM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508 875 0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

AM

Cars and Heavy Vehicles (Combined)

AM

	Wesson Street from East				North Street from South				Wesson Street from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Total
6:00 AM	1	3	0	4	4	3	0	7	1	2	0	3	14
6:15 AM	4	2	0	6	15	16	0	31	2	3	0	5	42
6:30 AM	1	4	0	5	17	11	0	28	5	2	0	7	40
6:45 AM	3	7	0	10	32	16	0	48	4	5	0	9	67
Total	9	16	0	25	68	46	0	114	12	12	0	24	163
7:00 AM	3	20	0	23	17	14	0	31	4	9	0	13	67
7:15 AM	5	8	0	13	49	18	0	67	9	11	0	20	100
7:30 AM	8	5	0	13	63	9	0	72	4	20	0	24	109
7:45 AM	5	7	0	12	102	18	0	120	16	42	0	58	190
Total	21	40	0	61	231	59	0	290	33	82	0	115	466
8:00 AM	3	3	0	6	32	15	0	47	9	31	0	40	93
8:15 AM	3	5	0	8	18	11	0	29	1	14	0	15	52
8:30 AM	11	5	0	16	18	6	0	24	3	10	0	13	53
8:45 AM	16	7	0	23	20	7	0	27	4	12	0	16	66
Total	33	20	0	53	88	39	0	127	17	67	0	84	264
Grand Total	63	76	0	139	387	144	0	531	62	161	0	223	893
Approach %	45.3	54.7	0.0		72.9	27.1	0.0		27.8	72.2	0.0		
Total %	7.1	8.5	0.0	15.6	43.3	16.1	0.0	59.5	6.9	18.0	0.0	25.0	
Exiting Leg Total				548				138				207	893
Cars	60	74	0	134	382	141	0	523	57	161	0	218	875
% Cars	95.2	97.4	0.0	96.4	98.7	97.9	0.0	98.5	91.9	100.0	0.0	97.8	98.0
Exiting Leg Total				543				131				201	875
Heavy Vehicles	3	2	0	5	5	3	0	8	5	0	0	5	18
% Heavy Vehicles	4.8	2.6	0.0	3.6	1.3	2.1	0.0	1.5	8.1	0.0	0.0	2.2	2.0
Exiting Leg Total				5				7				6	18

Peak Hour Analysis from 06:00 AM to 09:00 AM begins at:

7:15 AM	Wesson Street from East				North Street from South				Wesson Street from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Total
7:15 AM	5	8	0	13	49	18	0	67	9	11	0	20	100
7:30 AM	8	5	0	13	63	9	0	72	4	20	0	24	109
7:45 AM	5	7	0	12	102	18	0	120	16	42	0	58	190
8:00 AM	3	3	0	6	32	15	0	47	9	31	0	40	93
Total Volume	21	23	0	44	246	60	0	306	38	104	0	142	492
% Approach Total	47.7	52.3	0.0		80.4	19.6	0.0		26.8	73.2	0.0		
PHF	0.656	0.719	0.000	0.846	0.603	0.833	0.000	0.638	0.594	0.619	0.000	0.612	0.647
Cars	21	22	0	43	245	60	0	305	35	104	0	139	487
Cars %	100.0	95.7	0.0	97.7	99.6	100.0	0.0	99.7	92.1	100.0	0.0	97.9	99.0
Heavy Vehicles	0	1	0	1	1	0	0	1	3	0	0	3	5
Heavy Vehicles %	0.0	4.3	0.0	2.3	0.4	0.0	0.0	0.3	7.9	0.0	0.0	2.1	1.0
Cars Enter Leg	21	22	0	43	245	60	0	305	35	104	0	139	487
Heavy Enter Leg	0	1	0	1	1	0	0	1	3	0	0	3	5
Total Entering Leg	21	23	0	44	246	60	0	306	38	104	0	142	492
Cars Exiting Leg				349				57				81	487
Heavy Exiting Leg				1				4				0	5
Total Exiting Leg				350				61				81	492

PDI File #: **207442 A**
Location: **S: North Street**
Location: **E: Wesson Street W: Wesson Street**
City, State: **Grafton, MA**
Client: **Bristol Traffic/L.Bristol**
Site Code: **21900102**
Count Date: **Tuesday, February 11, 2020**
Start Time: **6:00 AM**
End Time: **9:00 AM**

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Class:

Cars

	Wesson Street from East				North Street from South				Wesson Street from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Total
6:00 AM	1	3	0	4	4	3	0	7	1	2	0	3	14
6:15 AM	4	2	0	6	13	16	0	29	2	3	0	5	40
6:30 AM	0	3	0	3	17	11	0	28	4	2	0	6	37
6:45 AM	3	7	0	10	32	16	0	48	3	5	0	8	66
Total	8	15	0	23	66	46	0	112	10	12	0	22	157
7:00 AM	3	20	0	23	16	13	0	29	4	9	0	13	65
7:15 AM	5	7	0	12	48	18	0	66	7	11	0	18	96
7:30 AM	8	5	0	13	63	9	0	72	3	20	0	23	108
7:45 AM	5	7	0	12	102	18	0	120	16	42	0	58	190
Total	21	39	0	60	229	58	0	287	30	82	0	112	459
8:00 AM	3	3	0	6	32	15	0	47	9	31	0	40	93
8:15 AM	3	5	0	8	17	11	0	28	1	14	0	15	51
8:30 AM	11	5	0	16	18	5	0	23	3	10	0	13	52
8:45 AM	14	7	0	21	20	6	0	26	4	12	0	16	63
Total	31	20	0	51	87	37	0	124	17	67	0	84	259
Grand Total	60	74	0	134	382	141	0	523	57	161	0	218	875
Approach %	44.8	55.2	0.0		73.0	27.0	0.0		26.1	73.9	0.0		
Total %	6.9	8.5	0.0	15.3	43.7	16.1	0.0	59.8	6.5	18.4	0.0	24.9	
Exiting Leg Total				543				131				201	875

Peak Hour Analysis from 06:00 AM to 09:00 AM begins at:

7:15 AM	Wesson Street from East				North Street from South				Wesson Street from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Total
7:15 AM	5	7	0	12	48	18	0	66	7	11	0	18	96
7:30 AM	8	5	0	13	63	9	0	72	3	20	0	23	108
7:45 AM	5	7	0	12	102	18	0	120	16	42	0	58	190
8:00 AM	3	3	0	6	32	15	0	47	9	31	0	40	93
Total Volume	21	22	0	43	245	60	0	305	35	104	0	139	487
% Approach Total	48.8	51.2	0.0		80.3	19.7	0.0		25.2	74.8	0.0		
PHF	0.656	0.786	0.000	0.827	0.600	0.833	0.000	0.635	0.547	0.619	0.000	0.599	0.641
Entering Leg	21	22	0	43	245	60	0	305	35	104	0	139	487
Exiting Leg				349				57				81	487
Total				392				362				220	974

PDI File #: **207442 A**
Location: **S: North Street**
Location: **E: Wesson Street W: Wesson Street**
City, State: **Grafton, MA**
Client: **Bristol Traffic/L.Bristol**
Site Code: **21900102**
Count Date: **Tuesday, February 11, 2020**
Start Time: **6:00 AM**
End Time: **9:00 AM**

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508 875 0100 Fax: 508-875-0118
Email: dataequests@pdillc.com

Class: **Heavy Vehicles-Combined (Buses, Single-Unit Trucks, Articulated Trucks)**

	Wesson Street from East				North Street from South				Wesson Street from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Total
6:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15 AM	0	0	0	0	2	0	0	2	0	0	0	0	2
6:30 AM	1	1	0	2	0	0	0	0	1	0	0	1	3
6:45 AM	0	0	0	0	0	0	0	0	1	0	0	1	1
Total	1	1	0	2	2	0	0	2	2	0	0	2	6
7:00 AM	0	0	0	0	1	1	0	2	0	0	0	0	2
7:15 AM	0	1	0	1	1	0	0	1	2	0	0	2	4
7:30 AM	0	0	0	0	0	0	0	0	1	0	0	1	1
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	1	2	1	0	3	3	0	0	3	7
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	1	0	0	1	0	0	0	0	1
8:30 AM	0	0	0	0	0	1	0	1	0	0	0	0	1
8:45 AM	2	0	0	2	0	1	0	1	0	0	0	0	3
Total	2	0	0	2	1	2	0	3	0	0	0	0	5
Grand Total	3	2	0	5	5	3	0	8	5	0	0	5	18
Approach %	60.0	40.0	0.0		62.5	37.5	0.0		100.0	0.0	0.0		
Total %	16.7	11.1	0.0	27.8	27.8	16.7	0.0	44.4	27.8	0.0	0.0	27.8	
Exiting Leg Total				5				7				6	18
Buses	2	2	0	4	4	2	0	6	4	0	0	4	14
% Buses	66.7	100.0	0.0	80.0	80.0	66.7	0.0	75.0	80.0	0.0	0.0	80.0	77.8
Exiting Leg Total				4				6				4	14
Single-Unit Trucks	1	0	0	1	1	1	0	2	1	0	0	1	4
% Single-Unit	33.3	0.0	0.0	20.0	20.0	33.3	0.0	25.0	20.0	0.0	0.0	20.0	22.2
Exiting Leg Total				1				1				2	4
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exiting Leg Total				0				0				0	0

Peak Hour Analysis from 06:00 AM to 09:00 AM begins at:

6:30 AM	Wesson Street from East				North Street from South				Wesson Street from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Total
6:30 AM	1	1	0	2	0	0	0	0	1	0	0	1	3
6:45 AM	0	0	0	0	0	0	0	0	1	0	0	1	1
7:00 AM	0	0	0	0	1	1	0	2	0	0	0	0	2
7:15 AM	0	1	0	1	1	0	0	1	2	0	0	2	4
Total Volume	1	2	0	3	2	1	0	3	4	0	0	4	10
% Approach Total	33.3	66.7	0.0		66.7	33.3	0.0		100.0	0.0	0.0		
PHF	0.250	0.500	0.000	0.375	0.500	0.250	0.000	0.375	0.500	0.000	0.000	0.500	0.625
Buses	0	2	0	2	2	0	0	2	3	0	0	3	7
Buses %	0.0	100.0	0.0	66.7	100.0	0.0	0.0	66.7	75.0	0.0	0.0	75.0	70.0
Single-Unit Trucks	1	0	0	1	0	1	0	1	1	0	0	1	3
Single-Unit %	100.0	0.0	0.0	33.3	0.0	100.0	0.0	33.3	25.0	0.0	0.0	25.0	30.0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Buses	0	2	0	2	2	0	0	2	3	0	0	3	7
Single-Unit Trucks	1	0	0	1	0	1	0	1	1	0	0	1	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Entering Leg	1	2	0	3	2	1	0	3	4	0	0	4	10
Buses				2				5				0	7
Single-Unit Trucks				0				1				2	3
Articulated Trucks				0				0				0	0
Total Exiting Leg				2				6				2	10

PDI File #: **207442 A**
Location: **S: North Street**
Location: **E: Wesson Street W: Wesson Street**
City, State: **Grafton, MA**
Client: **Bristol Traffic/L.Bristol**
Site Code: **21900102**
Count Date: **Tuesday, February 11, 2020**
Start Time: **6:00 AM**
End Time: **9:00 AM**

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Class:

Pedestrians

	Wesson Street from East						North Street from South						Wesson Street from West						
	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	U-Turn	CW-NB	CW-SB	Total	Total
6:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Approach %	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		
Total %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Exiting Leg Total						0						0						0	0

Peak Hour Analysis from 06:00 AM to 09:00 AM begins at:

6:00 AM	Wesson Street from East						North Street from South						Wesson Street from West						
	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	U-Turn	CW-NB	CW-SB	Total	Total
6:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Approach Total	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Entering Leg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exiting Leg						0						0						0	0
Total						0						0						0	0

PM

PDI File #: **207442 AA**
Location: **S: North Street**
Location: **E: Wesson Street W: Wesson Street**
City, State: **Grafton, MA**
Client: **Bristol Traffic/L.Bristol**
Site Code: **21900102**
Count Date: **Friday, February 14, 2020**
Start Time: **3:30 PM**
End Time: **6:30 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508 875 0100 Fax: 508-875-0118
Email: dataequests@pdillc.com

PM

Cars and Heavy Vehicles (Combined)

	Wesson Street from East				North Street from South				Wesson Street from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Total
3:30 PM	6	17	0	23	9	8	0	17	16	5	0	21	61
3:45 PM	4	14	0	18	10	8	0	18	21	5	0	26	62
Total	10	31	0	41	19	16	0	35	37	10	0	47	123
4:00 PM	11	17	0	28	7	12	0	19	24	7	0	31	78
4:15 PM	10	30	0	40	7	1	0	8	18	13	0	31	79
4:30 PM	8	28	0	36	5	4	0	9	27	7	0	34	79
4:45 PM	11	29	0	40	7	6	0	13	25	7	0	32	85
Total	40	104	0	144	26	23	0	49	94	34	0	128	321
5:00 PM	4	39	0	43	7	3	0	10	32	2	0	34	87
5:15 PM	13	37	0	50	15	4	0	19	19	2	0	21	90
5:30 PM	3	46	0	49	10	4	0	14	31	4	0	35	98
5:45 PM	8	20	0	28	5	6	0	11	11	3	0	14	53
Total	28	142	0	170	37	17	0	54	93	11	0	104	328
6:00 PM	4	16	0	20	8	7	0	15	11	3	0	14	49
6:15 PM	2	21	0	23	4	6	0	10	12	6	0	18	51
Total	6	37	0	43	12	13	0	25	23	9	0	32	100
Grand Total	84	314	0	398	94	69	0	163	247	64	0	311	872
Approach %	21.1	78.9	0.0		57.7	42.3	0.0		79.4	20.6	0.0		
Total %	9.6	36.0	0.0	45.6	10.8	7.9	0.0	18.7	28.3	7.3	0.0	35.7	
Exiting Leg Total				158				561				153	872
Cars	82	313	0	395	94	67	0	161	245	63	0	308	864
% Cars	97.6	99.7	0.0	99.2	100.0	97.1	0.0	98.8	99.2	98.4	0.0	99.0	99.1
Exiting Leg Total				157				558				149	864
Heavy Vehicles	2	1	0	3	0	2	0	2	2	1	0	3	8
% Heavy Vehicles	2.4	0.3	0.0	0.8	0.0	2.9	0.0	1.2	0.8	1.6	0.0	1.0	0.9
Exiting Leg Total				1				3				4	8

Peak Hour Analysis from 03:30 PM to 06:30 PM begins at:

4:45 PM	Wesson Street from East				North Street from South				Wesson Street from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Total
4:45 PM	11	29	0	40	7	6	0	13	25	7	0	32	85
5:00 PM	4	39	0	43	7	3	0	10	32	2	0	34	87
5:15 PM	13	37	0	50	15	4	0	19	19	2	0	21	90
5:30 PM	3	46	0	49	10	4	0	14	31	4	0	35	98
Total Volume	31	151	0	182	39	17	0	56	107	15	0	122	360
% Approach Total	17.0	83.0	0.0		69.6	30.4	0.0		87.7	12.3	0.0		
PHF	0.596	0.821	0.000	0.910	0.650	0.708	0.000	0.737	0.836	0.536	0.000	0.871	0.918
Cars	31	151	0	182	39	17	0	56	107	15	0	122	360
Cars %	100.0	100.0	0.0	100.0	100.0	100.0	0.0	100.0	100.0	100.0	0.0	100.0	100.0
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Vehicles %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cars Enter Leg	31	151	0	182	39	17	0	56	107	15	0	122	360
Heavy Enter Leg	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Entering Leg	31	151	0	182	39	17	0	56	107	15	0	122	360
Cars Exiting Leg				54				258				48	360
Heavy Exiting Leg				0				0				0	0
Total Exiting Leg				54				258				48	360

PDI File #: **207442 AA**
Location: **S: North Street**
Location: **E: Wesson Street W: Wesson Street**
City, State: **Grafton, MA**
Client: **Bristol Traffic/L.Bristol**
Site Code: **21900102**
Count Date: **Friday, February 14, 2020**
Start Time: **3:30 PM**
End Time: **6:30 PM**

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508 875-0109 Fax: 508-875-0118
Email: dataquest@pdillc.com

Class: **Cars**

	Wesson Street from East				North Street from South				Wesson Street from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Total
3:30 PM	5	17	0	22	9	8	0	17	15	4	0	19	58
3:45 PM	3	13	0	16	10	7	0	17	20	5	0	25	58
Total	8	30	0	38	19	15	0	34	35	9	0	44	116
4:00 PM	11	17	0	28	7	12	0	19	24	7	0	31	78
4:15 PM	10	30	0	40	7	0	0	7	18	13	0	31	78
4:30 PM	8	28	0	36	5	4	0	9	27	7	0	34	79
4:45 PM	11	29	0	40	7	6	0	13	25	7	0	32	85
Total	40	104	0	144	26	22	0	48	94	34	0	128	320
5:00 PM	4	39	0	43	7	3	0	10	32	2	0	34	87
5:15 PM	13	37	0	50	15	4	0	19	19	2	0	21	90
5:30 PM	3	46	0	49	10	4	0	14	31	4	0	35	98
5:45 PM	8	20	0	28	5	6	0	11	11	3	0	14	53
Total	28	142	0	170	37	17	0	54	93	11	0	104	328
6:00 PM	4	16	0	20	8	7	0	15	11	3	0	14	49
6:15 PM	2	21	0	23	4	6	0	10	12	6	0	18	51
Total	6	37	0	43	12	13	0	25	23	9	0	32	100
Grand Total	82	313	0	395	94	67	0	161	245	63	0	308	864
Approach %	20.8	79.2	0.0		58.4	41.6	0.0		79.5	20.5	0.0		
Total %	9.5	36.2	0.0	45.7	10.9	7.8	0.0	18.6	28.4	7.3	0.0	35.6	
Exiting Leg Total				157				558				149	864

Peak Hour Analysis from 03:30 PM to 06:30 PM begins at:

4:45 PM	Wesson Street from East				North Street from South				Wesson Street from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Total
4:45 PM	11	29	0	40	7	6	0	13	25	7	0	32	85
5:00 PM	4	39	0	43	7	3	0	10	32	2	0	34	87
5:15 PM	13	37	0	50	15	4	0	19	19	2	0	21	90
5:30 PM	3	46	0	49	10	4	0	14	31	4	0	35	98
Total Volume	31	151	0	182	39	17	0	56	107	15	0	122	360
% Approach Total	17.0	83.0	0.0		69.6	30.4	0.0		87.7	12.3	0.0		
PHF	0.596	0.821	0.000	0.910	0.650	0.708	0.000	0.737	0.836	0.536	0.000	0.871	0.918
Entering Leg	31	151	0	182	39	17	0	56	107	15	0	122	360
Exiting Leg				54				258				48	360
Total				236				314				170	720

PDI File #: **207442 AA**
Location: **S: North Street**
Location: **E: Wesson Street W: Wesson Street**
City, State: **Grafton, MA**
Client: **Bristol Traffic/L.Bristol**
Site Code: **21900102**
Count Date: **Friday, February 14, 2020**
Start Time: **3:30 PM**
End Time: **6:30 PM**

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508 875 0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Class: **Heavy Vehicles-Combined (Buses, Single-Unit Trucks, Articulated Trucks)**

	Wesson Street from East				North Street from South				Wesson Street from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Total
3:30 PM	1	0	0	1	0	0	0	0	1	1	0	2	3
3:45 PM	1	1	0	2	0	1	0	1	1	0	0	1	4
Total	2	1	0	3	0	1	0	1	2	1	0	3	7
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	1	0	1	0	0	0	0	1
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	1	0	1	0	0	0	0	1
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	2	1	0	3	0	2	0	2	2	1	0	3	8
Approach %	66.7	33.3	0.0		0.0	100.0	0.0		66.7	33.3	0.0		
Total %	25.0	12.5	0.0	37.5	0.0	25.0	0.0	25.0	25.0	12.5	0.0	37.5	
Exiting Leg Total				1				3				4	8
Buses	1	0	0	1	0	0	0	0	2	1	0	3	4
% Buses	50.0	0.0	0.0	33.3	0.0	0.0	0.0	0.0	100.0	100.0	0.0	100.0	50.0
Exiting Leg Total				1				2				1	4
Single-Unit Trucks	1	1	0	2	0	2	0	2	0	0	0	0	4
% Single-Unit	50.0	100.0	0.0	66.7	0.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0	50.0
Exiting Leg Total				0				1				3	4
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exiting Leg Total				0				0				0	0

Peak Hour Analysis from 03:30 PM to 06:30 PM begins at:

3:30 PM	Wesson Street from East				North Street from South				Wesson Street from West				
	Thru	Left	U-Turn	Total	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Total
3:30 PM	1	0	0	1	0	0	0	0	1	1	0	2	3
3:45 PM	1	1	0	2	0	1	0	1	1	0	0	1	4
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	1	0	1	0	0	0	0	1
Total Volume	2	1	0	3	0	2	0	2	2	1	0	3	8
% Approach Total	66.7	33.3	0.0		0.0	100.0	0.0		66.7	33.3	0.0		
PHF	0.500	0.250	0.000	0.375	0.000	0.500	0.000	0.500	0.500	0.250	0.000	0.375	0.500
Buses	1	0	0	1	0	0	0	0	2	1	0	3	4
Buses %	50.0	0.0	0.0	33.3	0.0	0.0	0.0	0.0	100.0	100.0	0.0	100.0	50.0
Single-Unit Trucks	1	1	0	2	0	2	0	2	0	0	0	0	4
Single-Unit %	50.0	100.0	0.0	66.7	0.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0	50.0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Buses	1	0	0	1	0	0	0	0	2	1	0	3	4
Single-Unit Trucks	1	1	0	2	0	2	0	2	0	0	0	0	4
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Entering Leg	2	1	0	3	0	2	0	2	2	1	0	3	8
Buses				1				2				1	4
Single-Unit Trucks				0				1				3	4
Articulated Trucks				0				0				0	0
Total Exiting Leg				1				3				4	8

The following are the Institute of Transportation Engineers graphs that are the standard reference for determining future traffic trips from Single Family Homes.

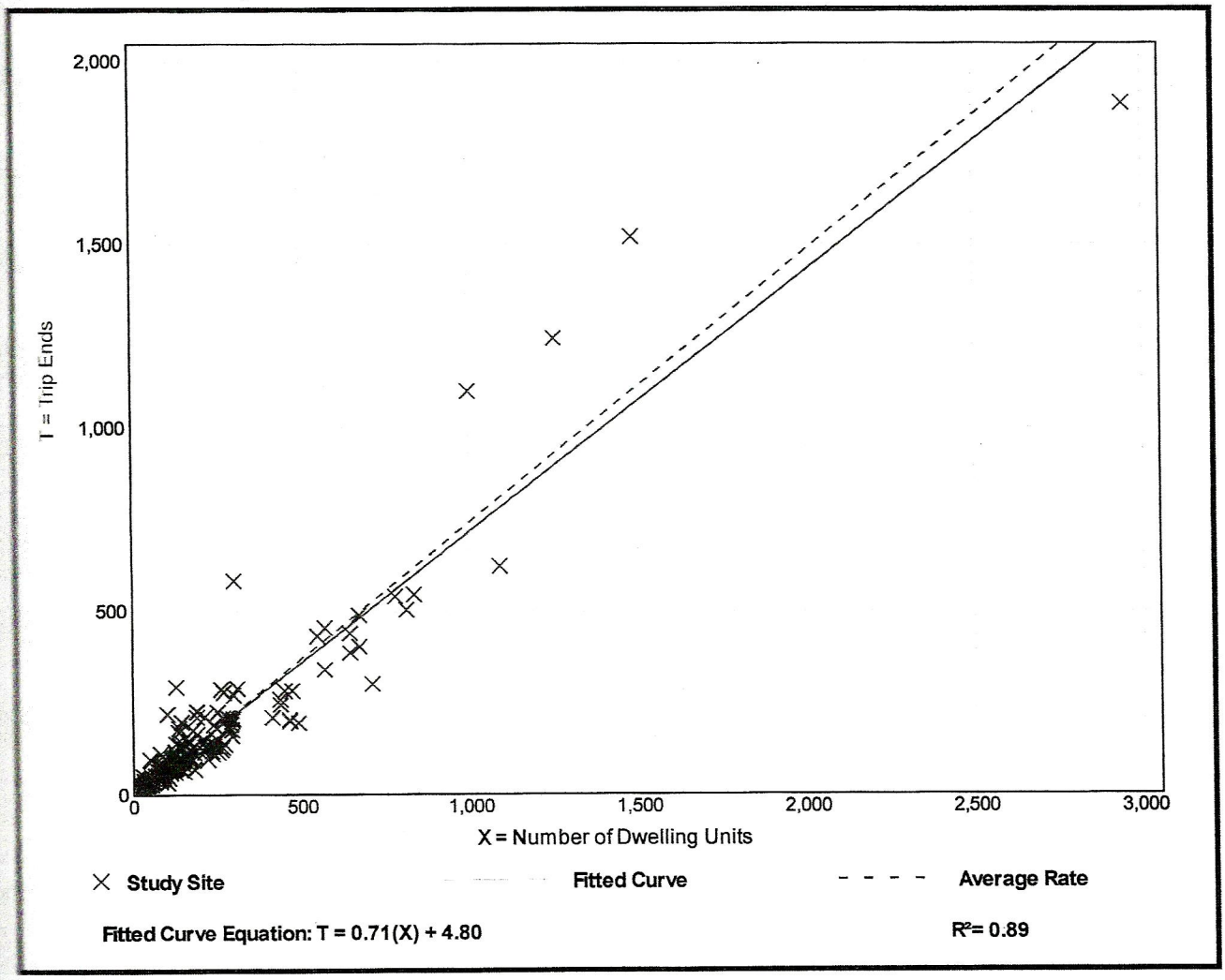
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 173
Avg. Num. of Dwelling Units: 219
Directional Distribution: 25% entering, 75% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.74	0.33 - 2.27	0.27

Data Plot and Equation



Fitted Curve Equation: T = 0.71(X) + 4.80

R^2= 0.89

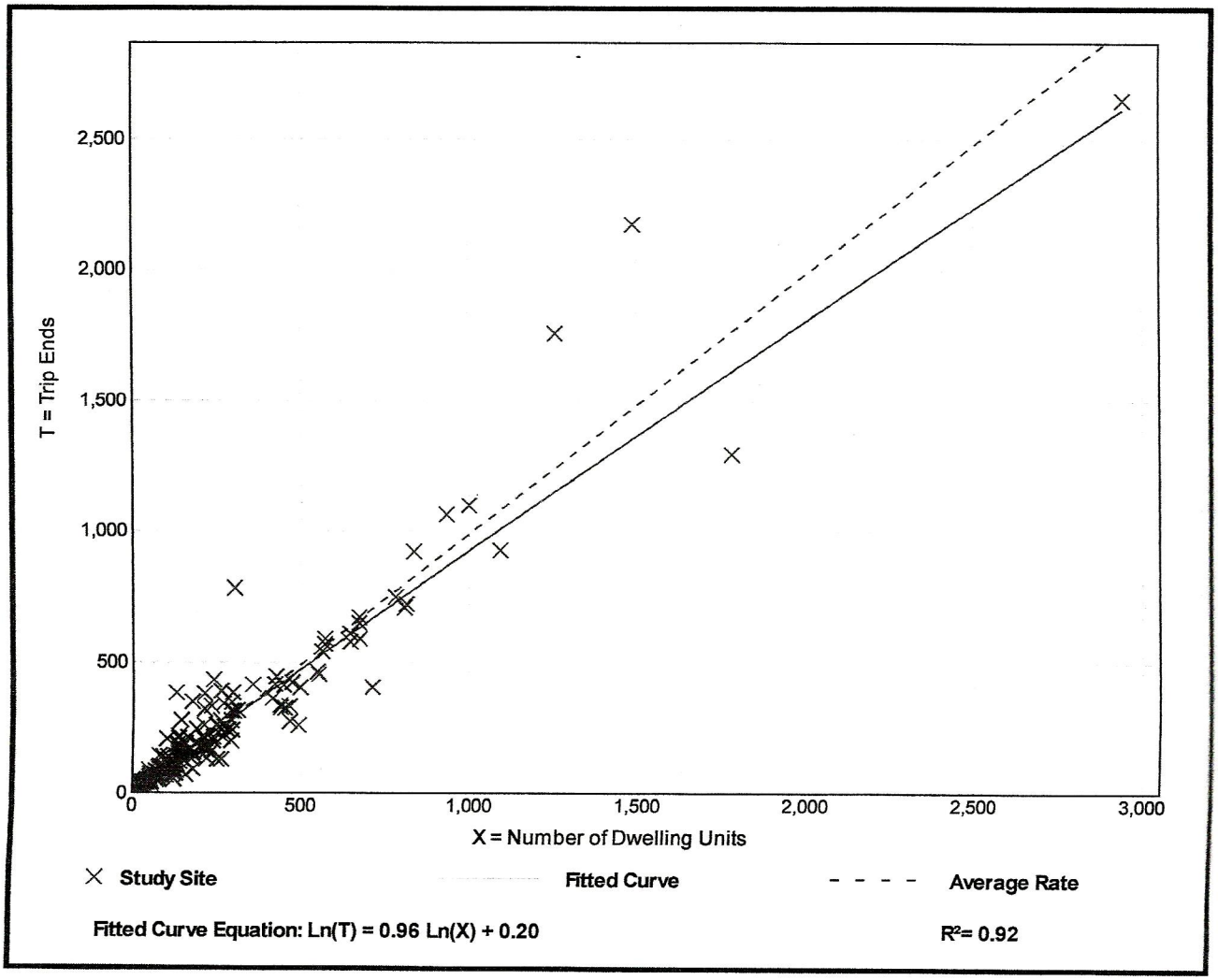
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 190
Avg. Num. of Dwelling Units: 242
Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.99	0.44 - 2.98	0.31

Data Plot and Equation



Single-Family Detached Housing
(210)

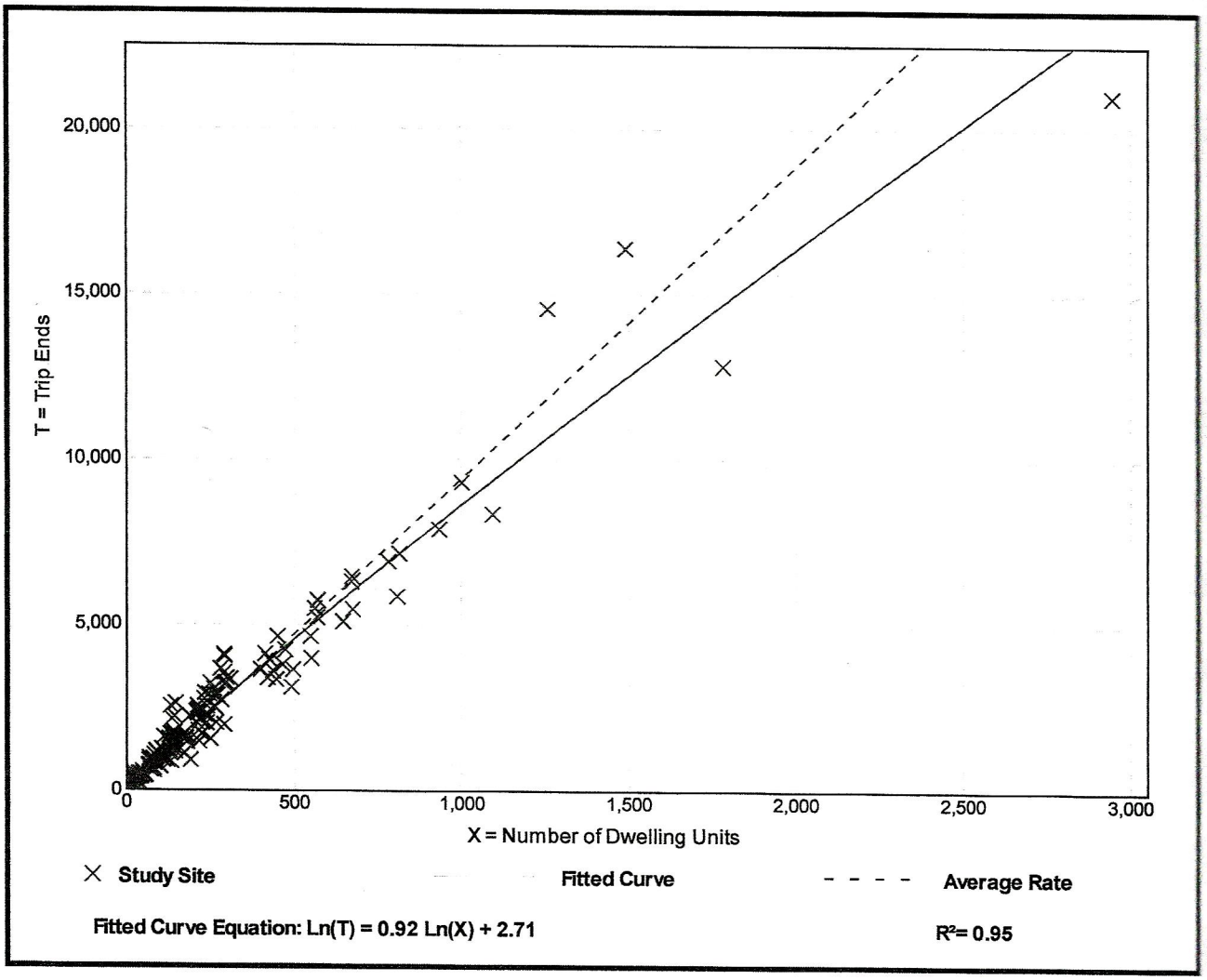
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 159
Avg. Num. of Dwelling Units: 264
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.44	4.81 - 19.39	2.10

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.92 Ln(X) + 2.71

R^2= 0.95

Single-Family Detached Housing
(210)

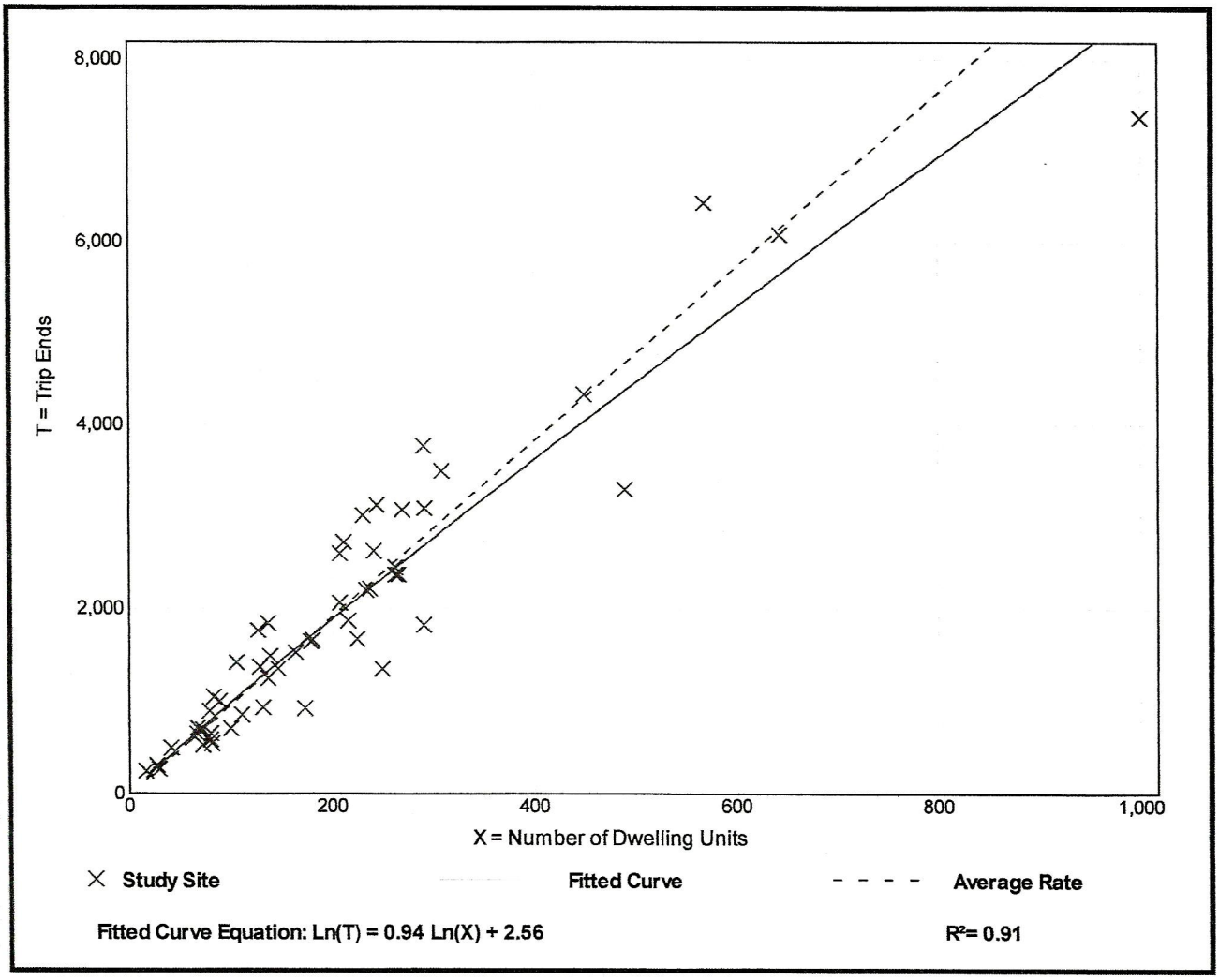
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Saturday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 52
Avg. Num. of Dwelling Units: 207
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.54	5.32 - 15.25	2.17

Data Plot and Equation



I-90 BRIDGE 48 HR ATR

PRECISION DATA INDUSTRIES, LLC
86 Morton Street, Framingham, MA 01702
Office: 508 875 0100 Fax: 508-875-0118
Email: datarequest@pdillc.com

North Street
north of I-90 Overpass
City, State: Grafton, MA
Client: BTTC/L.Bristol
Site Code: 21900102

PDI File #: 207442 ATR A

Count Date:
Tuesday, February 11, 2020

ATR

Volume

NB						SB						Combined					
Start Time:	15 min	60 min		15 min	60 min	Start Time:	15 min	60 min		15 min	60 min	Start Time:	15 min	60 min		15 min	60 min
12:00 AM	2		12:00 PM	6		12:00 AM	0		12:00 PM	12		12:00 AM	2		12:00 PM	18	
12:15 AM	0		12:15 PM	16		12:15 AM	1		12:15 PM	11		12:15 AM	1		12:15 PM	27	
12:30 AM	0		12:30 PM	8		12:30 AM	0		12:30 PM	12		12:30 AM	0		12:30 PM	20	
12:45 AM	0	2	12:45 PM	9	39	12:45 AM	0	1	12:45 PM	11	46	12:45 AM	0	3	12:45 PM	20	85
1:00 AM	0		1:00 PM	14		1:00 AM	1		1:00 PM	19		1:00 AM	1		1:00 PM	33	
1:15 AM	1		1:15 PM	4		1:15 AM	0		1:15 PM	18		1:15 AM	1		1:15 PM	22	
1:30 AM	0		1:30 PM	8		1:30 AM	0		1:30 PM	11		1:30 AM	0		1:30 PM	19	
1:45 AM	0	1	1:45 PM	6	32	1:45 AM	0	1	1:45 PM	14	62	1:45 AM	0	2	1:45 PM	20	94
2:00 AM	0		2:00 PM	24		2:00 AM	2		2:00 PM	13		2:00 AM	2		2:00 PM	37	
2:15 AM	0		2:15 PM	19		2:15 AM	0		2:15 PM	23		2:15 AM	0		2:15 PM	42	
2:30 AM	2		2:30 PM	16		2:30 AM	1		2:30 PM	16		2:30 AM	3		2:30 PM	32	
2:45 AM	0	2	2:45 PM	17	76	2:45 AM	0	3	2:45 PM	20	72	2:45 AM	0	5	2:45 PM	37	148
3:00 AM	1		3:00 PM	15		3:00 AM	1		3:00 PM	26		3:00 AM	2		3:00 PM	41	
3:15 AM	0		3:15 PM	11		3:15 AM	0		3:15 PM	28		3:15 AM	0		3:15 PM	39	
3:30 AM	0		3:30 PM	22		3:30 AM	0		3:30 PM	35		3:30 AM	0		3:30 PM	57	
3:45 AM	0	1	3:45 PM	7	55	3:45 AM	0	1	3:45 PM	26	115	3:45 AM	0	2	3:45 PM	33	170
4:00 AM	1		4:00 PM	20		4:00 AM	0		4:00 PM	42		4:00 AM	1		4:00 PM	62	
4:15 AM	0		4:15 PM	14		4:15 AM	1		4:15 PM	45		4:15 AM	1		4:15 PM	59	
4:30 AM	3		4:30 PM	15		4:30 AM	0		4:30 PM	47		4:30 AM	3		4:30 PM	62	
4:45 AM	3	7	4:45 PM	10	59	4:45 AM	0	1	4:45 PM	63	197	4:45 AM	3	8	4:45 PM	73	256
5:00 AM	11		5:00 PM	5	46	5:00 AM	1		5:00 PM	54		5:00 AM	12		5:00 PM	59	
5:15 AM	6		5:15 PM	18		5:15 AM	4		5:15 PM	56	246	5:15 AM	10		5:15 PM	74	292
5:30 AM	10		5:30 PM	13		5:30 AM	1		5:30 PM	73		5:30 AM	11		5:30 PM	86	
5:45 AM	18	45	5:45 PM	18	54	5:45 AM	0	6	5:45 PM	45	228	5:45 AM	18	51	5:45 PM	63	282
6:00 AM	8		6:00 PM	12		6:00 AM	5		6:00 PM	28		6:00 AM	13		6:00 PM	40	
6:15 AM	30		6:15 PM	5		6:15 AM	5		6:15 PM	41		6:15 AM	35		6:15 PM	46	
6:30 AM	31		6:30 PM	8		6:30 AM	7		6:30 PM	13		6:30 AM	38		6:30 PM	21	
6:45 AM	48	117	6:45 PM	12	37	6:45 AM	10	27	6:45 PM	26	108	6:45 AM	58	144	6:45 PM	38	145
7:00 AM	30		7:00 PM	2		7:00 AM	24		7:00 PM	25		7:00 AM	54		7:00 PM	27	
7:15 AM	68		7:15 PM	6		7:15 AM	21		7:15 PM	23		7:15 AM	89		7:15 PM	29	
7:30 AM	71	301	7:30 PM	7		7:30 AM	8	64	7:30 PM	18		7:30 AM	79	365	7:30 PM	25	
7:45 AM	119	288	7:45 PM	3	18	7:45 AM	22	75	7:45 PM	7	73	7:45 AM	141	363	7:45 PM	10	91
8:00 AM	43		8:00 PM	1		8:00 AM	13		8:00 PM	10		8:00 AM	56		8:00 PM	11	
8:15 AM	29		8:15 PM	6		8:15 AM	9		8:15 PM	12		8:15 AM	38		8:15 PM	18	
8:30 AM	22		8:30 PM	3		8:30 AM	9		8:30 PM	5		8:30 AM	31		8:30 PM	8	
8:45 AM	27	121	8:45 PM	4	14	8:45 AM	12	43	8:45 PM	5	32	8:45 AM	39	164	8:45 PM	9	46
9:00 AM	10		9:00 PM	2		9:00 AM	11		9:00 PM	9		9:00 AM	21		9:00 PM	11	
9:15 AM	15		9:15 PM	2		9:15 AM	9		9:15 PM	7		9:15 AM	24		9:15 PM	9	
9:30 AM	14		9:30 PM	0		9:30 AM	9		9:30 PM	4		9:30 AM	23		9:30 PM	4	
9:45 AM	14	53	9:45 PM	1	5	9:45 AM	7	36	9:45 PM	3	23	9:45 AM	21	89	9:45 PM	4	28
10:00 AM	10		10:00 PM	4		10:00 AM	5		10:00 PM	1		10:00 AM	15		10:00 PM	5	
10:15 AM	10		10:15 PM	1		10:15 AM	5		10:15 PM	7		10:15 AM	15		10:15 PM	8	
10:30 AM	4		10:30 PM	0		10:30 AM	6		10:30 PM	1		10:30 AM	10		10:30 PM	1	
10:45 AM	8	32	10:45 PM	0	5	10:45 AM	11	27	10:45 PM	3	12	10:45 AM	19	59	10:45 PM	3	17
11:00 AM	6		11:00 PM	2		11:00 AM	15		11:00 PM	3		11:00 AM	21		11:00 PM	5	
11:15 AM	2		11:15 PM	2		11:15 AM	9		11:15 PM	0		11:15 AM	11		11:15 PM	2	
11:30 AM	14		11:30 PM	0		11:30 AM	13		11:30 PM	0		11:30 AM	27		11:30 PM	0	
11:45 AM	12	34	11:45 PM	0	4	11:45 AM	14	51	11:45 PM	2	5	11:45 AM	26	85	11:45 PM	2	9
Total	703			398		Total	272			973		Total	975			1371	
Percent	63.85%			36.15%		Percent	21.85%			78.15%		Percent	41.56%			58.44%	
Day Total			1101			Day Total			1245			Day Total			2346		
Peak Hour	7:15 AM			2:00 PM		Peak Hour	7:00 AM			4:45 PM		Peak Hour	7:15 AM			4:45 PM	
Volume	301			76		Volume	75			246		Volume	365			292	
P.H.F.	0.632			0.792		P.H.F.	0.781			0.842		P.H.F.	0.647			0.849	

North Street
north of I-90 Overpass
City, State: Grafton, MA
Client: BTTC/L.Bristol
Site Code: 21900102

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508 875 0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

PDI File #: 207442 ATR A

Count Date:
Wednesday, February 12, 2020

Volume

NB						SB						Combined					
Start Time:	15 min	60 min		15 min	60 min	Start Time:	15 min	60 min		15 min	60 min	Start Time:	15 min	60 min		15 min	60 min
12:00 AM	0		12:00 PM	4		12:00 AM	2		12:00 PM	16		12:00 AM	2		12:00 PM	20	
12:15 AM	0		12:15 PM	10		12:15 AM	2		12:15 PM	21		12:15 AM	2		12:15 PM	31	
12:30 AM	0		12:30 PM	20		12:30 AM	0		12:30 PM	12		12:30 AM	0		12:30 PM	32	
12:45 AM	1	1	12:45 PM	17	51	12:45 AM	0	4	12:45 PM	10	59	12:45 AM	1	5	12:45 PM	27	110
1:00 AM	0		1:00 PM	11		1:00 AM	0		1:00 PM	13		1:00 AM	0		1:00 PM	24	
1:15 AM	0		1:15 PM	9		1:15 AM	0		1:15 PM	15		1:15 AM	0		1:15 PM	24	
1:30 AM	0		1:30 PM	8		1:30 AM	0		1:30 PM	17		1:30 AM	0		1:30 PM	25	
1:45 AM	0	0	1:45 PM	9	37	1:45 AM	0	0	1:45 PM	12	57	1:45 AM	0	0	1:45 PM	21	94
2:00 AM	2		2:00 PM	24		2:00 AM	0		2:00 PM	15		2:00 AM	2		2:00 PM	39	
2:15 AM	1		2:15 PM	14		2:15 AM	0		2:15 PM	14		2:15 AM	1		2:15 PM	28	
2:30 AM	1		2:30 PM	19		2:30 AM	2		2:30 PM	16		2:30 AM	3		2:30 PM	35	
2:45 AM	0	4	2:45 PM	16	73	2:45 AM	0	2	2:45 PM	22	67	2:45 AM	0	6	2:45 PM	38	140
3:00 AM	0		3:00 PM	9		3:00 AM	0		3:00 PM	28		3:00 AM	0		3:00 PM	37	
3:15 AM	0		3:15 PM	10		3:15 AM	0		3:15 PM	28		3:15 AM	0		3:15 PM	38	
3:30 AM	0		3:30 PM	10		3:30 AM	0		3:30 PM	24		3:30 AM	0		3:30 PM	34	
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4:00 AM	0		4:00 PM	15		4:00 AM	0		4:00 PM	49		4:00 AM	0		4:00 PM	64	
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4:45 AM	2	5	4:45 PM	12	50	4:45 AM	0	1	4:45 PM	73	202	4:45 AM	2	6	4:45 PM	85	252
5:00 AM	7		5:00 PM	11		5:00 AM	1		5:00 PM	86		5:00 AM	8		5:00 PM	97	
5:15 AM	9		5:15 PM	16		5:15 AM	2		5:15 PM	55		5:15 AM	11		5:15 PM	71	
5:30 AM	8		5:30 PM	9		5:30 AM	0		5:30 PM	84		5:30 AM	8		5:30 PM	93	
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6:00 AM	6		6:00 PM	13		6:00 AM	3		6:00 PM	28		6:00 AM	9		6:00 PM	41	
6:15 AM	27		6:15 PM	8		6:15 AM	5		6:15 PM	46		6:15 AM	32		6:15 PM	54	
6:30 AM	28		6:30 PM	16		6:30 AM	3		6:30 PM	15		6:30 AM	31		6:30 PM	31	
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7:00 AM	40		7:00 PM	3		7:00 AM	25		7:00 PM	24		7:00 AM	65		7:00 PM	27	
7:15 AM	59		7:15 PM	6		7:15 AM	17		7:15 PM	10		7:15 AM	76		7:15 PM	16	
7:30 AM	59		7:30 PM	5		7:30 AM	10		7:30 PM	15		7:30 AM	69		7:30 PM	20	
7:45 AM	112	270	7:45 PM	15	29	7:45 AM	26	78	7:45 PM	10	59	7:45 AM	138	348	7:45 PM	25	88
8:00 AM	36		8:00 PM	5		8:00 AM	14		8:00 PM	13		8:00 AM	50		8:00 PM	18	
8:15 AM	34		8:15 PM	10		8:15 AM	10		8:15 PM	11		8:15 AM	44		8:15 PM	21	
8:30 AM	35		8:30 PM	5		8:30 AM	4		8:30 PM	7		8:30 AM	39		8:30 PM	12	
8:45 AM	33	138	8:45 PM	4	24	8:45 AM	14	42	8:45 PM	8	39	8:45 AM	47	180	8:45 PM	12	63
9:00 AM	21		9:00 PM	2		9:00 AM	12		9:00 PM	6		9:00 AM	33		9:00 PM	8	
9:15 AM	16		9:15 PM	4		9:15 AM	8		9:15 PM	9		9:15 AM	24		9:15 PM	13	
9:30 AM	13		9:30 PM	4		9:30 AM	8		9:30 PM	4		9:30 AM	21		9:30 PM	8	
9:45 AM	12	62	9:45 PM	4	14	9:45 AM	11	39	9:45 PM	4	23	9:45 AM	23	101	9:45 PM	8	37
10:00 AM	11		10:00 PM	2		10:00 AM	5		10:00 PM	6		10:00 AM	16		10:00 PM	8	
10:15 AM	10		10:15 PM	7		10:15 AM	5		10:15 PM	5		10:15 AM	15		10:15 PM	12	
10:30 AM	8		10:30 PM	1		10:30 AM	9		10:30 PM	2		10:30 AM	17		10:30 PM	3	
10:45 AM	7	36	10:45 PM	2	12	10:45 AM	15	34	10:45 PM	4	17	10:45 AM	22	70	10:45 PM	6	29
11:00 AM	7		11:00 PM	4		11:00 AM	11		11:00 PM	3		11:00 AM	18		11:00 PM	7	
11:15 AM	7		11:15 PM	1		11:15 AM	6		11:15 PM	1		11:15 AM	13		11:15 PM	2	
11:30 AM	16		11:30 PM	1		11:30 AM	4		11:30 PM	0		11:30 AM	20		11:30 PM	1	
11:45 AM	14	44	11:45 PM	1	7	11:45 AM	15	36	11:45 PM	0	4	11:45 AM	29	80	11:45 PM	1	11
Total	714			433		Total	272			1027		Total	986			1460	
Percent	62.25%			37.75%		Percent	20.94%			79.06%		Percent	40.31%			59.69%	
Day Total			1147			Day Total			1299			Day Total			2446		
Peak Hour	7:00 AM			2:00 PM		Peak Hour	7:00 AM			4:45 PM		Peak Hour	7:00 AM			4:45 PM	
Volume	270			73		Volume	78			298		Volume	348			346	
P.H.F.	0.603			0.760		P.H.F.	0.750			0.866		P.H.F.	0.630			0.892	